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BEFORE THE
PUBLIC UTILITIES COMMISSION OF OHIO

| | | |
|---|---|---|
| In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Authority to Establish a Standard Service Offer Pursuant to § 4928.143, Ohio Rev. Code, in the Form of an Electric Security Plan. | ) | Case Nos. 11-346-EL-SSO<br>11-348-EL-SSO |
| In the Matter of the Application of Columbus Southern Power Company and Ohio Power Company for Approval of Certain Accounting Authority. | ) | Case Nos. 11-349-EL-AAM<br>11-350-EL-AAM |

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**FIRSTENERGY SOLUTIONS CORP.'S**
**NOTICE OF FILING DEPOSITION TRANSCRIPTS**

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FirstEnergy Solutions Corp. ("FES"), pursuant to O.A.C. 4901-1-24, hereby provides notice to all parties that it is filing the following deposition transcripts:

- Exhibit A- Thomas S. Lyle
- Exhibit B- Laura J. Thomas (non-confidential portion only, confidential portion filed under seal with FES Motion for Protective Order)
- Exhibit C- Anil K. Makhija
- Exhibit D- Chantale LaCasse
- Exhibit E- Joseph Hamrock
- Exhibit F- Stephen J. Baron
- Exhibit G- Philip J. Nelson
- Exhibit H- David Rousch

Respectfully submitted,

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## CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing *FirstEnergy Solutions Corp.'s Notice of Filing Deposition Transcripts* was served this 29th day of August, 2011, via e-mail upon the parties below.

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BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

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In the Matter of the :
Application of Columbus :
Southern Power Company :
and Ohio Power Company :
for Authority to Establish:
a Standard Service Offer : Case No. 11-346-EL-SSO
Pursuant to §4928.143, : Case No. 11-348-EL-SSO
Ohio Rev. Code, In the :
Form of an Electric :
Security Plan. :

In the Matter of the :
Application of Columbus :
Southern Power Company : Case No. 11-349-EL-AAM
and Ohio Power Company : Case No. 11-350-EL-AAM
for Approval of Certain :
Accounting Authority. :

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DEPOSITION

of Anil Kumar Makhija, PhD, taken before me, Maria DiPaolo Jones, a Notary Public in and for the State of Ohio, at the offices of Porter, Wright, Morris & Arthur, LLP, 41 South High Street, Columbus, Ohio, on Wednesday, July 27, 2011, at 9:07 a.m.

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Wednesday Morning Session,
July 27, 2011.

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STIPULATIONS

It is stipulated by and among counsel for the respective parties that the deposition of Anil Kumar Makhija, PhD, a witness called by the intervenors under the applicable Rules of Civil Procedure, may be reduced to writing in stenotypy by the Notary, whose notes thereafter may be transcribed out of the presence of the witness; and that proof of the official character and qualification of the Notary is waived.

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Wednesday Morning Session,
July 27, 2011.

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(EXHIBIT MARKED FOR IDENTIFICATION.)
(Witness sworn.)
MR. ALEXANDER: Good morning. My name is Trevor Alexander, and I am one of the lawyers representing FirstEnergy Solutions Corporation. At this point could all of the parties that are present in person please identify themselves.
MR. SINENENG: Philip Sineneng on behalf of Duke Energy Retail.
MR. SMALZ: Mike Smalz on behalf of the Appalachian Peace and Justice Network.
MR. CONWAY: And on behalf of AEP-Ohio, Daniel R. Conway, Porter, Wright, Morris & Arthur, and with me, of course, today is Dr. Makhija.
MR. ALEXANDER: Now could all parties that are participating by telephone please identify themselves.
MR. PETRICOFF: Howard Petricoff representing Constellation and Exelon Generation.
MR. HAYDEN: Mark Hayden on behalf of FirstEnergy Solutions.



MR. LANG: Jim Lang on behalf of FirstEnergy Solutions.
MR. DARR: Frank Darr on behalf of IEU.
MR. ETTER: Terry Etter, OCC.
MR. CONWAY: Could you give me your name again, please?
MR. ETTER: Terry Etter from the office of the Ohio Consumers' Counsel.
MR. CONWAY: Anybody else? Did someone just join the call?
(No response.)

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ANIL KUMAR MAKHIJA, PhD
being by me first duly sworn, as hereinafter certified, deposes and says as follows:

EXAMINATION

By Mr. Alexander:
Q. Okay. Dr. Makhija, I'm going to be asking you a few questions today. If you don't understand something, please just let me know and I'll rephrase it or have the court reporter read it back. If you need to take a break, please just let me know. I'll just ask that you don't take a break while the question is pending.



It is important to wait until I have completely finished the question before answering. When you do answer, please state your answers clearly and do not use gestures, shrugs, nod your head, or use phrases like "uh-huh" because those will not be reflected in the transcript. Do you understand?
A. Yes, I do.
Q. During this deposition we are going to be discussing the Black-Scholes model. As you did in your testimony, I'm going to refer to this model as the Black model. Do you understand that definition?
A. Yes, I do.
Q. As another definition of convenience, I'm going to refer to Ohio Power Company and Columbus Southern Power Company as "AEP." Do understand that definition?
A. Yes.
Q. Could you please state your name for the record and provide the correct spelling.
A. Yes. My name is Anil Kumar Makhija, and the spellings are Anil, A-n-i-l, middle name Kumar, K-u-m-a-r, and last name Makhija, M-a-k-h-i-j-a.
Q. I am handing you what the court reporter has marked as Exhibit 1. Do you recognize this

document?

MR. CONWAY: Is this his prefiled testimony?

MR. ALEXANDER: Yes.

A. Yes, I do.

Q. Do you believe that all the testimony contained in this exhibit is still true and accurate?

A. Yes, I do.

Q. If you were asked these same questions again right now, would your answers be the same?

A. Yes.

Q. Is the address listed on page 1, line 2 still your correct business address?

A. Yes, it is.

Q. And is your compensation for testifying in this case based in any way on the eventual outcome of this litigation?

A. No.

Q. There's no contingency fee or success fee?

A. No.

Q. You were deposed on June 20th, 2011, in case number 08-917-EL-SSO; isn't that correct?

A. Are you referring to this case number



here, case number 08-917-EL-SSO?

Q. That's correct.

A. Yes.

MR. CONWAY: You're referring to the deposition in the ESP remand case?

MR. ALEXANDER: That is correct.

MR. CONWAY: That was taken over at OCC's office?

MR. ALEXANDER: That is correct. On June 20th, 2011.

MR. CONWAY: And the question is? Does he remember?

MR. ALEXANDER: You were deposed on that date.

MR. CONWAY: Okay. Yes.

A. Yes.

Q. Okay. Other than that deposition have you ever been deposed before?

A. In other cases, yes.

Q. Do you recall what cases those were?

A. To the best of my recall, they would include SEET related cases, which is the significantly excess earnings test.

MR. CONWAY: Anil needs to go back. I



think I might have said he was -- I mentioned OCC's office, but wasn't your deposition -- it was a telephonic deposition?

THE WITNESS: Yes. I was in Korea at the time.

MR. CONWAY: Sorry.

THE WITNESS: Yeah.

MR. CONWAY: He had a telephonic deposition taken, you probably remember that, don't you? Okay.

Q. (By Mr. Alexander) So is the SEET case the case number 10-1261 which is referenced on page 1, line 18 of your testimony?

A. I believe so.

Q. Have you ever been deposed -- other than in that case have you ever been deposed before?

A. I don't think so.

Q. Other than the cases identified in your testimony at page 1, lines 15 to 18 have you ever testified in any other proceedings before the Public Utilities Commission of Ohio?

A. To the best of my recall, I have deposed in the context of the SEET proceedings and subsequently now in the context of the POLR



proceedings and that's about it.

Q. And other than as identified in your testimony have you ever testified before FERC or any state agency regarding public utility matters or the Black model?

A. No, I have not.

Q. Again, other than as identified in your testimony have you ever testified as an expert in any proceeding?

A. Yes, and I'm trying to recall circumstances. I have testified before the FASB, which is the Financial Accounting Standards Board, and also I have made presentations before a court in Pennsylvania, and I have also submitted testimony before FERC in the context of use of risk measures for rate proceedings.

Q. For the FERC matter do you recall the case number or case caption?

A. No, I do not recall it at this moment, but this is something one could get for you later.

Q. Okay.

MR. ALEXANDER: Dan, can you coordinate that?

MR. CONWAY: No. If you want to make a





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discovery request, you can submit it, and if it's timely and we're obliged to respond, we will. But we're not going to conduct written discovery in the course of deposition.

MR. ALEXANDER: So you're declining to provide the case number for the FERC case the witness just testified to.

MR. CONWAY: I said I wouldn't commit to responding to oral discovery requests during the deposition. If you want to submit a discovery request, we'll take a look at it and give you a response.

MR. ALEXANDER: I appreciate that.

A. Would it help you to know that that matter, that submission, was perhaps more than 25 years ago?

Q. That is helpful. Thank you. And what were the circumstances of your testimony before the FASB?

A. I think the, again, this is also going back decades, but I think this was in the context of treatment of a canceled nuclear power plant in terms of its accounting disclosure.

Q. What were the circumstances of your



testimony before the Pennsylvania court?

A. This goes back to the time when FERC was considering alternative mechanisms of rate of return proceedings and they were considering alternative measures that could be used in rate hearings, and along with another professor I submitted testimony or shall I say a report which laid out the relative measures that could be used in rate of return proceedings.

Q. Do you recall the case caption or case number?

A. As I said, it goes back decades, and I do not have recall for it right now.

Q. Do you recall who you were testifying on behalf of?

A. To the best of my recall, I think it was on behalf of Wisconsin Consumers Association.

Q. To return to the FERC matter, do you recall who you were testifying on behalf of in that matter?

A. In that matter I believe it was Duquesne Power & Light.

Q. Did you mean Duke, or did you mean Dayton Power & Light?



A. No, I mean Duquesne in Pennsylvania.

Q. Did you review any documents in preparation for your deposition today?

A. Yes.

Q. What did you review?

A. To the best of my recall, I looked at the Supreme Court opinion in this matter, and I have skimmed through testimony provided by the company witnesses and also from selected intervenors.

Q. When you say "the Supreme Court opinion in this matter," do you mean case number 08-917?

A. Correct. This is about the POLR issue, yes.

Q. Have you reviewed the testimony of AEP Witness Thomas in preparation for this deposition?

A. I have looked at it.

Q. And have you reviewed the testimony of AEP Witness LaCasse in preparation for this deposition?

A. I have looked at it.

Q. And you testified you reviewed the testimony of selected intervenors. Do you recall which intervenor testimony you reviewed?

A. As I think about it, the names that come



to mind are Witness Lesser and Mack Thompson.

Q. Any others?

A. I may have looked at others, but none that I recall right off.

Q. Did you see any drafts of the testimony for other AEP witnesses as they were being prepared?

A. Yes, I think I did.

Q. Which witnesses?

A. The very two that I mentioned earlier.

Q. Which would be Thomas and LaCasse?

A. Yes.

Q. Did you provide comments on those drafts?

A. I don't think I provided anything substantial in terms of either of those witnesses.

Q. Did you review any of the workpapers relating to AEP's testimony in this case?

MR. CONWAY: In this case, what are you referring to?

MR. ALEXANDER: I am referring to case number 11-346, et al.

MR. CONWAY: So you're talking about ESP II, right?

MR. ALEXANDER: Yes. The case we're taking this deposition in, correct.

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A. What do you consider in your definition of workpapers?
Q. Any of the documents supporting the calculation of the POLR charge.
A. No, I did not.
Q. Did you review any of the workpapers relating to AEP's testimony in case number 08-917 using the same definition of workpapers?
A. Now you're referring to the remand case?
Q. That's correct.
A. Again, I was not involved in any of the calculations.
Q. But did you review those calculations?
A. I did not review the implementation aspects of it. I only saw the testimony as -- the filings.
Q. Do you have any other education, training, certificates, or degrees other than as reflected on page 1, lines 6 through 13 of your testimony?
A. Those are my qualifications, yes.
Q. And did any portion of your education include discussion of the Black model?
A. As part of my education in getting a PhD

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in finance I was exposed to the Black model.
Q. By "exposed," it was something talked about in your classes?
A. Yes.
Q. Have you ever coauthored or authored any published articles or books?
A. I have been the editor of, I'm trying to remember how many different books, but several. And in terms of articles, dozens of articles.
MR. CONWAY: Have you seen his testimony in the SEET proceedings, Counselor?
MR. ALEXANDER: I have not.
MR. CONWAY: Well, you might want to take a look at that. It provides a little more robust description of his publications and other activities.
MR. ALEXANDER: Thank you.
Q. Have you ever authored any published materials relating to the Black model or the wholesale, retail, or energy market? Excuse me, let me strike that question.
MR. CONWAY: Why don't you break it up a little bit.
MR. ALEXANDER: Yeah, I misspoke there.
Q. Have you ever authored any articles

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relating to the Black model?
A. I have a working paper which uses the Black and Scholes model, but -- which referenced to the Black and Scholes model, but not done any work on the Black model per se.
Q. When you say "working paper," was that paper published anywhere?
A. No. It's under review at the journal.
Q. Which journal?
A. Strategic Management Journal, SMJ.
Q. Have you ever published any articles relating to the wholesale or retail energy market?
A. No, I have not.
Q. Do you have any practical experience relating to the use or implementation of the Black model?
MR. CONWAY: Could you read that back, please?
(Record read.)
A. My experience is limited to my academic work related to the Black model.
Q. Have you ever -- strike that.
Do you know the fundamental assumptions of the Black model?

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A. I believe I do.
Q. And what are those assumptions?
A. The Black model makes the following assumptions: It assumes that markets are performing perfectly; it assumes a constant volatility rate, a constant risk-free rate, a constant strike price; and if it is a European model, European option, it assumes a strike at maturity; and the returns on the underlying asset are assumed to be lognormally distributed.
Q. If we had perfect knowledge regarding all of the inputs to the Black model such as volatility, risk-free interest rate, et cetera, what would the resulting answer provided by the Black model tell us?
A. The purpose of the Black model is to provide a valuation of the option and -- are you referring to the call option aspect of it so that I can answer you more accurately?
Q. Let's start with the call option.
A. It will then provide you the value of the call option.
Q. And for the put option?
A. Well, for the put option typically you would have to invoke the put-call parity to then take

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out the put component of it.
Q. Would it be fair for me to say that the Black model identifies the price at which an option can be purchased in order to create a hedged transaction?
A. The purposes of the model is to provide a valuation. As to what purpose you want to then attach that to, that's up to you. So certainly you can own the call by itself, it's not necessary for you to obtain it for the purposes of hedging, but certainly to give you an idea of what the value of the hedge might be.
Q. Will publicly traded options always trade at the Black model price?
A. No model is perfect, but the Black model is so predominantly used as a measure of pricing of options, so really your question is do actual prices and the option prices, are they perfectly in sync at all times? And the answer would be no.
Q. Why would options trade at anything other than the Black model value?
A. Well, you will recall the assumptions that I laid out, and one of the assumptions is the nature of the market itself. Sometimes markets are

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thin in which trading does not occur with enough liquidity so that the model may not have its assumptions of perfect markets meet properly. There will also be transaction costs that can cause a deviation between model prices and observed prices.
So a number of deviations from the underlying structure of the model from actual market transactions could result in discrepancies.
Q. Could one cause of discrepancies be different implied volatility assumptions by buyers and sellers?
MR. CONWAY: Could I have that question reread, please?
(Record read.)
A. So the mechanism of providing inputs to a model will deterministically lead to different answers. So if I put in a different volatility number than someone else, then I should expect a different valuation figure.
Q. So that would be or it could be one of the causes of a market price being different than the Black model price.
A. Well, the market price is a slightly different issue because the market price speaks to

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the market consensus regarding the volatility. But if you think of the option pricing as a formula, then as different people for various reasons have heterogeneity in their volatility estimates, will put in different inputs into the formula and come up with different answers, but that does not mean that the market does not develop its consensus in its own prices.
Q. Does the Black model attempt to quantify the anticipated out-of-pocket cost of selling an option?
A. It's a double compound question because you have both the anticipated and the realized, the out-of-pocket being the realized elements.
MR. CONWAY: So I guess I'll make an objection, then, to the form of the question. But if you can answer it, go ahead.
A. Would you like me to continue?
Q. Please.
A. Or would you like to split your question into the two compound parts?
Q. Okay. Does the Black model attempt to quantify the anticipated cost of selling an option?
A. Yes, because the notion of the model is

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to look at the potential variations that might occur on the underlying asset and, therefore, the model is, in fact, built on the notion of ex ante or anticipated costs. Now, what those actual costs may turn out to be in reality, that's the other part of your earlier question.
Q. Well, I'd like to explore that a little bit, but first, does the model attempt to quantify out-of-pocket costs of selling an option?
A. Only -- the model only tries to estimate the expected costs. To the extent that actual out-of-pocket costs are ex-post costs, they will in most cases differ from the anticipated.
Q. How does the model attempt to define costs at all?
A. Okay. So first of all the notion of cost is one that arises in the application that we are dealing with today which is with regard to POLR costs, in that sense when we look at the valuation through an option scheme, we are looking at what will be the anticipated cost that will occur because of deviations of market prices from the SSO prices.
So to the extent that these deviations might occur on account of volatility, that it is





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those deviations that get priced today as we try to value the option. So in that sense these are the anticipated costs.

Now, in reality, once you have bought an option based on these anticipated costs which are a reflection of the volatility that you perceive going forward, but when you actually go through time, they may be winners and losers in the sense that the realized differences between market prices and the SSO prices may turn out to be more or less than had been anticipated so that subsequently the actual cost realized may differ from the anticipated cost. The anticipated cost defined the liability that is taken on by the firm.

Q. Let me make sure I understand your testimony. I believe you previously testified that the Black model is a model used to value an option; is that correct?

A. Yes.

Q. And so how does the value of an option relate to the costs incurred by the seller of the option?

A. Okay. So when a company provides, in this context, an option to consumers, it is providing



to the consumers a certain optionality benefit. So this optionality benefit cannot appear out of thin air, it is, therefore, a liability to someone else who has to meet the consequences of the optionality to the consumer and, consequently, that will be a liability to the firm.

To the extent that if you think of two different firms, one that provided the optionality, one that did not, the one that has provided the optionality, therefore, incurs an incremental or shall I say additional liability that the other one did not and, therefore, forms a cost to that first company.

Q. So your theory is that the value of an option by definition equals the cost to the seller of the option.

A. In the context of the POLR, because that's where the companies are handing over something to -- an optionality to someone else, then they are taking on a liability, yes.

Q. So your theory would not hold true with regard to other options such as corn futures.

A. In any transaction where one party has taken the optionality and it is the liability of the



other party, my theory continues to hold.

Q. When would the theory not continue to hold?

A. The nature of an option is that it has two parties, one that has the benefit from an optionality and another that takes the liability to meet that optionality, so it's inherent in the nature of options in that it creates two parties, for one a benefit and the other a liability.

Now, these are in anticipated sense. As things evolve in reality, some become winners and some become losers, and the reason why parties still enter into these transactions in the market sometimes is because of their different anticipations.

Q. I'm going to rephrase the question because I'm not sure we're on the same wavelength.

A. Sure.

Q. Your theory is that the value of an option by definition equals the cost to the seller of the option, and my question was when would that theory not hold true?

A. And what I'm saying is that it is inherent in the nature of options that it creates two parties and one takes on a liability and the other



takes on the optionality.

Q. So you believe the theory would hold true at any time there's an option with two parties.

A. Two parties, yes.

Q. Let's explore your theory a little bit. Suppose, for example, that a corn contract, to stay with our previous hypothetical, was sold by a corn farmer. In that case let us also assume that the market price rises in excess of the strike price. Now, the corn farmer could satisfy that contract at his actual cost, correct?

A. The moment the corn farmer has given this option to someone, in essence he has agreed to take the strike price in the future as his deliverable price. So if the actual price goes up, then he's still getting only the strike price and stands to lose to the amount of the differential between the higher market price and the strike price. So, again, you see, whoever bought that option in the ex post as things turned out, so to speak, ended up getting a benefit.

Now, at the time they were delivered presumably they were equilibrated in the sense that, you know, the optionality provided by the farmer to,





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in this case perhaps a speculator may have been based on, you know, a recognition of a fair price at that point in time.

But in reality, of course, you know, actual prices don't stay at, you know, the anticipated price permanently. Sometimes they are more or less, and that's what creates the ex-post winners and losers, but at the time that the farmer did that, he created a liability for himself because he provided the optionality to someone else to benefit from it.

Q. But to satisfy that liability he could provide the corn physically, correct?

A. He could, but given that the market price of corn has gone up, he would be providing an equivalent value, I presume, in corn. As you know, in reality these are settled by financial differentials.

Q. But, of course -- strike that.

Now, if I sold that corn option not being a corn farmer and I wanted to settle that same transaction, I would have to cover at the then-current market price, correct?

A. Correct.



Q. And so then I would have an out-of-pocket expense to cover that loss, correct?

A. Correct.

Q. Which would be different than the farmer's potential out-of-pocket expense, correct?

A. To the extent that the prevailing market price of corn would reflect the value of the physical corn that you will give, the financial consequences would be identical.

Q. Only if you -- strike that.

The financial consequences would only be identical if you take into account the opportunity lost to the farmer to sell at the new higher market price, correct?

A. His corn has become whatever is now the prevailing market price, so his opportunity cost is the market price. And consequently his physical corn, whether he delivers the corn itself or purchases it in the market, it will cost the same to satisfy the liability created by the option that he delivered.

Q. Let me create some definitions so I know we're talking about the same thing.

A. Sure.



Q. For actual cost I'm going to refer to all the costs of production of the corn. For opportunity cost I am referring to the difference between the strike price of the option and the new higher market price that the farmer could have sold at absent this option contract.

A. May I suggest, so that we are both on the same terms, that the opportunity cost be referred to as the prevailing market price of corn, perhaps in the spot market at that point, or the forward market.

Q. Sure. And we can refer to the prevailing market price of corn –

A. Because the differential will tell us the profit and so I don't want to refer to the differential as the opportunity price for corn.

Q. So how are we referring to that differential?

A. As the ex-post profit or loss.

Q. Okay. And so using those definitions --

A. Yes.

Q. -- the farmer would have an out-of-pocket expense for the cost of production, correct?

A. Yes.

Q. And the farmer loses the opportunity to



make a profit on the variable we have defined as an ex-post profit differential, correct?

A. Correct.

Q. But as a nonfarmer seller of that same option, both the actual cost variable and the ex-post profit differential would be an out-of-pocket expense for me.

A. Perhaps we should also emphasize that as far as the option component is concerned, the farmer and the nonfarmer participating in the same transaction experience exactly the same profit differentials and it's the optionality part which is at issue here.

Because if you're a farmer, you have physical corn irrespective of the cost at which you produced it. This corn would have been delivered at the strike price if prices had stayed at the strike price, let's say, but a differential developed. And that differential creates either a profit or a loss. And that differential is identical to the differential that would be produced for a nonfarmer who had delivered the same option. So in that sense the optionality component reproduces the same price differentials be it the farmer or anyone else.

How the farmer would have bought with the corn, that's a second variation, because the optionality component produces the same profit-loss profile.

MR. ALEXANDER: Could you please read back that question.

(Record read.)

Q. Was your answer "yes"?

THE WITNESS: Can I have the question again.

(Record read.)

A. The answer is no because as far as the price differentials are concerned, which is what the option component is all about, the experience of the farmer and the nonfarmer taking on the same options is identical.

Q. Dr. Makhija, I think you're answering a different question than I'm asking. If I don't have the corn to satisfy the option contract and have to satisfy that contract at the end of the term, I have to cover it at market, correct?

A. Correct.

Q. And so I would have to pay money to cover that at market, correct?



A. Correct.

Q. And so all of that money that I pay would be an out-of-pocket expense for me, correct?

A. In the ex post sense, yes.

Q. That's all I was trying to establish.

A. Yes.

Q. Would you agree with me that any attempt to use the Black model to estimate out-of-pocket costs would be an incorrect use of the model because the model is just not designed to do that?

MR. CONWAY: And by "out-of-pocket" you're again talking about ex-post factors or costs, not ex ante?

MR. ALEXANDER: No, I am not, but I will add that distinction.

MR. CONWAY: Okay.

A. The model is not built to estimate realizations of price differentials. It is built on anticipated volatility.

Q. And it's built to determine the value of an option on the market, correct?

A. That's correct.

Q. Now I'd like to add a point of clarification, as I told Mr. Conway I would. When I



refer to out-of-pocket costs, do you believe by definition that has to be an ex-post analysis?

A. It does not universally have to be an ex-post item.

Q. Because we could anticipate out-of-pocket costs, correct?

A. To some extent, yeah.

Q. And in some circumstances we can estimate the out-of-pocket costs.

A. Even while I agree to the hypothetical possibility, I just want us to be alerted that the particular optionality that we are talking about does not deal with ex-post costs in this particular circumstance because the options are based on anticipated effects of volatility not on ex-post costs.

Q. I just want to understand we're using the same definitions.

A. Okay.

Q. In some circumstances we can estimate on an ex ante basis out-of-pocket costs.

A. Yes.

Q. And the Black model does not attempt to do that.



A. The Black model is not built on looking at ex-post realizations.

Q. The Black model assumes a perfectly fixed strike price, correct?

A. While the classical model is built on a fixed strike price, the implementation can accommodate changing strike prices because the model itself is frequently implemented not through its formula, but through a binomial methodology which allows for these kinds of alterations to be accommodated.

Q. In those circumstances you'd be running the Black model for a series of options as opposed to one three-year option. Let me rephrase that question.

The Black model assumes a European option, correct?

A. Yes.

Q. And --

A. The classical, yeah.

Q. And what type of option does the option provided to Ohio consumers -- strike that. That was not good.

Is the option provided to Ohio consumers more similar to a European option or an American option?

A. It's closer to an American option.

Q. And so AEP has attempted to modify the Black model to account for the American style of option provided to Ohio consumers, correct?

A. While I'm not up on the implementation details, I do agree with you that they seem to have applied the European option. I should quickly add that, as you know, the European option -- rather, the American option would be more valuable because it provides the consumer the opportunity to exercise at multiple points.

Q. When you say -- excuse me. I didn't mean to step on your answer. Were you finished?

MR. CONWAY: No, he wasn't.

A. Almost. So the American option would actually be worth more because it would provide more optionality, so in that answer, if they model it as a European option, they are taking a more conservative position.

Q. When you say that the American option is worth more, aren't you assuming that both options have an identical term?



A. When comparing equivalent maturities, you are correct, then the American option is of greater value than the European option.

Q. And can you testify with certainty that the series of European options created by AEP is worth more or less than an American option provided for a three-year term?

MR. CONWAY: Are you talking about the -- well, I'll object to the form.

MR. ALEXANDER: Okay. Your objection is in the record.

MR. CONWAY: The assumption is that you've now hopped to a series of options approaching --

MR. ALEXANDER: Your objection is in the record.

MR. CONWAY: I think it's unclear.

MR. ALEXANDER: Mr. Conway, your objection's in the record.

MR. CONWAY: Okay.

THE WITNESS: Could you please read the question again?

(Record read.)

A. To the best of my recall, I don't believe



that AEP actually has a series of European options, but rather it is an option value at the beginning of the ESP for the period of the ESP. So I'm not quite sure about the question of a series of European options.

At any rate, I have not been involved in the implementation details of their application.

Q. That's fair. I'd like to explore exactly what you've been involved with and then we'll come back to this issue once we've established that.

A. Sure.

Q. Have you personally reviewed the formula applied by AEP in this case?

A. No, I have not.

Q. And do you have an opinion as to whether AEP's proposed formula is correct?

A. Without having looked at the implementation details, I do not have a position on that.

Q. And have you examined the calculation of the inputs such as volatility or risk-free interest rate that AEP has used in this case?

A. No, I have not.

Q. Do you have an opinion as to whether each



value used by AEP for each input is correct in all respects?

A. I do not.

Q. Have you examined the assumptions such as the switching assumptions of the model used by AEP?

A. I have not looked at the implementation of the switching characteristics.

Q. Do you have an opinion as to whether the assumptions used by AEP in this case are correct in all respects?

A. I have not looked at the implementation.

Q. So you don't have an opinion on that?

A. Because I don't know the implementation's -- I do not -- from what I glean from the testimony of Witness Laura Thomas, the principles that I have sponsored seem to be an application, but the actual implementation details is something I have not been involved in.

Q. Do you have an opinion as to whether the assumptions used by AEP in this case are correct in all respects?

A. Yes, to the extent that what I read in Witness Thomas's testimony is consistent with the principles that I sponsored.

Q. What assumptions are you referring to?
A. A number of assumption: That an optionality is created for customers, that this optionality creates a liability for AEP companies, and such an optionality can be valued through the application of the Fisher model and --
MR. CONWAY: Excuse me. Could you read back the last couple words.
(Record read.)
A. Sorry. The Black model.
MR. CONWAY: Fisher is his first name. Black is his last name.
A. Fisher is his first name. The Black model.
-- and the related essential principles of how to structure such a modeling problem.
Q. You say how to structure the modeling problem. Would that include how to structure shopping constraints?
A. That would be an implementation detail. I'm referring here to the use of an optionality and its valuation as a basic principle.
Q. And you have not reviewed the implementation details.



A. No, I have not.
Q. So you can't tell me if AEP's math is correct.
A. No, I could not.
Q. Have you reviewed the constraints incorporated into AEP's model?
A. To the extent that Witness Thomas refers to the switching constraints for customers and for other -- residential customers and other customers, I'm aware of it, but I have not examined how they implemented it in their use of the Black model.
Q. Do you have an opinion as to whether the constraints incorporated into the Black model are correct in all respects?
A. Only to the extent as mentioned in the Witness Thomas testimony where it is described that residential customers that can leave and return except if they take power from the May 15 to September 15 period, in which case they must -- they are constrained to stay until April 15th the next year. Similarly, there is a constraint on the commercial and industrial customers.
Q. Dr. Makhija, I understand what's in Witness Thomas's testimony. I'm just trying to



understand what you're providing an opinion on here. Are you providing an opinion as to whether the constraints as actually incorporated by AEP are correct in all respects?
A. I do not know the implementation of how these constraints were accommodated in the model.
Q. So the answer would be "no"?
A. Correct.
Q. Would you agree with me that the Black model assumes economically rational customer behavior?
A. Yes.
Q. And would you agree with me that the Black model's assumption that customers will act in an economically rational basis would tend to overstate the POLR charge?
A. No. Counting on the irrationality of consumers to value a liability would be improper.
Q. Have you reviewed Dr. LaCasse's testimony on this point?
A. I have read her testimony. Please tell me which specific aspects you would like me to talk about.
Q. Dr. LaCasse identifies that -- strike



that.
Does AEP's calculation in this case take any steps to quantify the number of customers who do not act in an economically rational manner?
A. I don't think they do.
Q. And does AEP's calculation in this case take any steps to quantify the financial impact of customers who do not act in an economically rational manner?
A. I don't think they do.
Q. Have you done any independent analysis to determine whether it would be possible for AEP to hedge its POLR risk?
A. To the best of my knowledge, there is no liquid market for the disposal of POLR risk, but I have not done the study to -- on that aspect.
Q. Why haven't you looked at that issue?
A. I took the presumption that the company, as its managerial prerogative, must have compared its alternatives and decided that they would absorb the POLR risk itself as an optimal outcome. Besides, I'm not aware of any liquid markets for POLR risk.
Q. And do you have any actual knowledge as to whether AEP management has looked at hedging as a

lower cost alternative to mitigating POLR risk?
A. I do not know what exactly they looked at.
Q. And hedging costs is something we could look at on an ex ante basis, correct?
A. The very notion of hedging is ex ante.
Q. Based on your understanding of how the Black model is being applied in this case, would the Black model suggest that a hundred percent shopping would occur when market prices were below the ESP rate and a hundred percent retention would occur when market prices are above the ESP rate?
A. No. Remember, and this is something that I have said in my testimony as well, customers may look at price differentials that occur and consider some of them to be temporary and not act on them. But if they feel that this is a sustained price differential, then they may act on it.
Q. I'm not sure I understand. So the Black model values an option at market, correct?
A. Correct.
Q. And within that model there's an assumption that customers will act in an economically rational basis, correct?



A. Correct.
Q. And the model looks at volatility to determine where the market price may be in relation to the strike price, correct?
A. Correct.
Q. And one of the assumptions of that model is that whenever the market price is below the strike price, then the customer will exercise its option.
A. Correct.
Q. How would the customer's expectations of the future be included in that model when the model assumes a fixed strike price and an economically rational customer?
A. Correct. So one of the inputs in the model is the prevailing price of the underlying asset. And suppose that markets were illiquid for a moment in time, then the price signal that you might receive might not be the reliable price signal that you want to input into the model for its rational valuation.
So if you see a temporary electricity per market price below the SSO price but it happens in a illiquid set of circumstances, you might hesitate till you get affirmation of that price, at which



point rationally the model would give you the right outcome.
So every time you see a price differential, you will not see a hundred percent movement, a hundred percent movement of customers to exploit that price differential as they try to affirm whether that is the input to put into the model.
Q. I understand your testimony with regard to sort of game theory and how that's applied, but are you testifying that the model also takes this into account?
A. No. The model -- you put in the input set of variables and it gives you an answer. The question is how good are those input variables that you are putting in. And rational customers would look at the prevailing strike price -- sorry, prevailing electricity price, which is one of the inputs into the model, and ask themselves whether this is a good input to put into the model.
If the market happened to be thin at a moment in time, they may not consider that price as a reliable input to put into that model; so they would be acting rationally. And the moment they feel that this is, in fact, a reliable, stable price



differential, they may then rationally act on it.
So the point I'm trying to make is that every time you see a price differential you may not expect even rational customers to en masse transfer one way or the other, meaning go shopping or return.
Q. Just to be clear, are you right now talking about within the model or practically here in Ohio?
A. I'm talking about the model itself and the inputs that go into it and how those inputs depend on market conditions.
Q. Is this customer consideration of the duration at which a market price will be below the strike price incorporated into AEP's calculation under the Black model?
A. I do not know the answer to that question.
Q. Because you haven't looked at AEP's actual formula.
A. Correct.
Q. And so this is just your opinion as to factors that should be considered.
A. Yes.
Q. Does the Black model attempt to quantify

the revenue which AEP would have received absent shopping?
A. No, it does not address that issue.
Q. And do you have an opinion as to whether AEP should be entitled to recover for all of the revenue it would have received if customers did not have the option to shop?
THE WITNESS: Could I have that question read back?
(Record read.)
A. To the extent that AEP was provided the opportunity to earn the SSO price, any deviations that occur from that are a deviation from expected revenue earnings.
Q. Dr. Makhija, I don't think you answered my question. Do you have an opinion as to whether AEP should be entitled to recover for all of the revenue it would have received if customers did not have the opportunity to shop?
A. Yes.
Q. What is that opinion?
A. That they should have the opportunity. That was your question.
Q. No. My question was do you have an



opinion as to whether AEP should be entitled to recover for all of the revenue it would have received if customers did not have the opportunity to shop.
A. And the answer, again, is yes, that they should have the opportunity to earn the revenue that they would have earned in the absence of shopping.
Q. So you believe AEP should be entitled to recover for a hundred percent of the revenue that it would have received absent shopping.
A. Correct.
Q. And what is the basis for that opinion?
A. To the extent that I believe that when they signed on for the SSO, that that is the revenue they would have been receiving. But when migration occurs, then shortfalls in that revenue are created on account of that shopping and, consequently, it produces variation in their earnings which produces risk and causes ultimately a diminution in the value of their equity.
Q. Dr. Makhija, you understand that the shopping restrictions are -- excuse me. Let me strike that.
Dr. Makhija, you understand that the right to shop is a creation of statute?



A. Okay.
Q. And you understand that the ESP that AEP has proposed in this case expressly anticipates shopping.
A. But your question was in the absence of shopping what revenue should we anticipate them to expect.
Q. No. My question was should AEP be entitled to recover for the revenue that it loses as a result of shopping. Your answer is?
A. The answer is that there should be a mechanism for them to recover losses that are produced by shopping.
Q. And does the Black model identify the revenue that AEP would have received absent shopping?
A. It produces a value of the liability which is a reflection of the potential loss of revenue.
Q. How is the market value of an option contract a reflection of the revenue that AEP would have received absent shopping?
A. I'll be happy to explain that. At the time when the option is created at the beginning of the ESP the value of that option reflects the



potential losses in revenue that might come about because customers have that optionality.
Remember that customers will exercise that optionality when, for example, market prices fall below the SSO price, which is now the loss of revenue we've been talking about. And so the option tries to value the effect of such revenue differentials that can occur on account of customers acting on the optionality.
So the evaluation that occurs at the beginning of the ESP for giving away this POLR optionality is -- is the liability created because of these losses in revenue that will occur as customers will act on their optionality. So there is a one-to-one correspondence here between loss in revenue and the value of the liability taken on at the beginning of the ESP.
Q. Let's explore this with some actual numbers.
A. Okay.
Q. Suppose the SSO price is $70 and the market -- per megawatt-hour, and suppose the market price --
MR. CONWAY: I'm sorry. Could you give

me the numbers again?
MR. ALEXANDER: Sure. $70 per megawatt hour.
MR. CONWAY: Is the market price?
MR. ALEXANDER: Is the SSO price.
MR. CONWAY: Okay.
Q. (By Mr. Alexander) And suppose the market price goes to $69 per megawatt-hour. AEP's lost revenue under your definition would be $70 per megawatt-hour, correct?
A. No. The loss would be the 70 minus the 69, the price differential, because now they would have to dispose of that same output at a $1 loss per megawatt-hour.
Q. Correct. So it would have been the gross revenue that would have been received by customers less an offset for new revenue that was allowed by shopping.
A. Right.
Q. And does that calculation include new revenues beyond energy sales that AEP would be receiving as a result of shopping?
A. So this is merely about the optionality which is focused only on the price differential



between what the SSO would have got AEP-Ohio versus what it gets now by disposing the same output at the lower prevailing market price.
Q. The same output of energy?
A. Of electricity.
Q. Does it include an offset for capacity payments received by AEP?
A. Well, I thought the question was about, you know, the price per megawatt-hour which is what is now being disposed in the market at 69 instead of 70. So we are merely talking about the same output being delivered, this is not a statement about the underlying capacity on other items at all.
Q. That's fair. That's fair, because in the first you would assume that both energy and capacity were included in the SSO price, and in the second you wouldn't assume that was energy only, correct? Strike that question. You don't need to answer it.
A. Yeah.
Q. But you would agree with me that all revenue that AEP receives as a result of shopping, be it capacity payments or the ability to sell energy elsewhere, should be offset against the revenue lost by AEP from a customer migrating.



A. It's only the price differential that is relevant here because that's the gain or losses that could occur. In this case it would be only losses because customers would only act when they can get electricity cheaper in the alternative form.
Q. And the Black model does not attempt to quantify the various sources of revenue that AEP would receive, various new sources of revenue that AEP would receive as a result of shopping.
A. Correct. It looks only at the price differential effect and values that as a liability.
Q. And the Black model looks only at the price differential effect between the SSO price and the market price paid by retail customers.
A. Well, it does not have to be retail customers. It could be whether AEP has to dispose of its generation or other electricity to wholesale or, you know, whatever mechanism it disposes it so that the issue is they were going to get an SSO-based revenue and now they have it at whatever price they're able to dispose of their electricity to, you know, be it new retail customers, if possible, which is unlikely, or to any other, you know, wholesale purchaser.



Q. And would that market price that's input into that model be the market prices proposed by AEP for use in this case?
A. Again, I don't know the implementation details --
Q. Fair enough.
A. -- but they would want to estimate some form of competitive market price.
Q. Could you look at page 2, lines 17 to 23. In particular the section that says "These very benefits to customers of Utility A constitute a potential liability to Utility A."
MR. CONWAY: Could you give me the cite again, please.
MR. ALEXANDER: Page 2, lines 17 to 23, so that he can receive the context, and the specific language quoted was at lines 20 and 21.
A. I've got those lines.
Q. The bulk of this answer relates to benefits received by customers, but in this section you used the word "liability." Can you explain what the definition of the word "liability" as you used it in this sentence is?
A. Yes. Utility A stands to lose revenue in

the future and the reason for that loss of revenue is because customers will act to their benefit when they see these price differentials which are being discussed in this paragraph. So in order for the customers to have that optionality or benefit, the company consequently suffers a liability.

Q. I just want to understand the definition of the word "liability." How are you defining the word "liability" as you used it in this sentence?

A. It's -- let me take a moment here.

The use of the word "liability" is in a classical sense here where a company stands to lose on account of a benefit provided to someone else. So there is a counterparty that can get certain gains and, consequently, to satisfy those gains the company, therefore, stands to lose on account of that. So it's that potential loss which is a liability for the company.

Q. Just because a counterparty may receive a benefit, does that, by definition, mean that Utility A must suffer a loss?

A. To satisfy the benefits of the counterparty creates the possibilities of loss for Utility A, and it is this possibility of a loss which



constitutes a liability.

Q. You said you used the phrase "liability" in the classical sense. Is that different than the generally accepted accounting principle sense?

A. The only differential here would be that I'm talking here about the market value of liability whereas GAAP, et cetera would typically deal with the book values of liability. Because here I'm dealing with what would be the market value of the loss created for Utility A on account of taking on this potential payoff or losses really, not payoffs, that occur because of the optionality given to customers.

Q. Just so I'm clear, by "losses" you're referring not to necessarily out-of-pocket losses, but rather the potential lost opportunity to sell power to customers.

A. Correct. Correct.

Q. At line 22 on this same page you state that "The liability is certain." Do you mean that the amount of the liability is certain at the moment the ESP period starts?

A. Yes. In the sense that the moment the ESP is beginning and AEP-Ohio is taking on a POLR obligation, given volatility, given the maturity of



the optionality being given, et cetera, you know, all the items that would explicitly define the option being given.

Q. So wouldn't it be more accurate to say that the anticipated amount of the liability is certain at the at the beginning of the ESP period?

THE WITNESS: Could you please repeat that?

(Record read.)

A. Yes. And you are correct in the sense that the option only estimates the anticipated liability.

Q. Because the market price could, theoretically, stay above the SSO price for the entire ESP period in which case there would be no actual liability.

A. But, remember, the nature of options is that even if it is out of the money, as you described it, the option still has a value because of volatility. What might today be out of the money could turn into in the money down the road.

Q. Sure. I understand your position. I'm just trying to determine if the amount of the liability as a dollar amount is certain at the



beginning of the ESP period.

A. Yes, it is.

MR. ALEXANDER: Could you repeat the question? I'm not sure the witness understood it.

(Record read.)

A. Once again, my answer is yes, it is certain in a dollar amount for the following reasons: That at the start of the ESP there is a set of conditions which are explicitly accommodated into the option model, they include the prevailing electricity market price, they include the strike price, they include the risk-free rate, they include the volatility, et cetera, and when all of these things are taken into account in the model, it produces a dollar value of the optionality being given to customers. And whatever is given is, therefore, a form of reliability to the company itself, consequently, the dollar value of that liability is known for certain at the start.

Now, in reality over time indeed there will be winners and losers because, as I said earlier, the ex-post movement of prices relative to the strike price would be a differential that could be beneficial to the company or to the customers.





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But the potential for those revenue losses is present at the very beginning of the ESP and the option values that and gives you a certain dollar amount.
Q. Suppose the market price drops to 50 percent of the SSO price and a hundred percent of customers migrate. In that case wouldn't the option price understate the actual liability as you have defined it here today?
A. That is correct. So what may happen is ex post there will be winners and losers, but as anticipated, based on all the information available to us at the start of the ESP, the option gives us the best estimate available to us given the state of our knowledge about how to value such liabilities, it gives us an estimate of the value.
Now, the circumstance you described may be a very unlikely one but one that may occur given the nature of the volatility, and so there are sometimes extreme winners and extreme losers. Generally that doesn't happen, but the option simply values the most likely possibilities and it actually includes all possibilities, but tries to give an estimate of a fair value of the possibilities that would occur.

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Q. So you would agree that the anticipated liability's known at the beginning of the ESP term, but the actual liability for the ESP term will not be known until the end of the ESP term.
A. Correct. The realizations may differ.
MR. CONWAY: Would it be possible to take a break for about five minutes?
MR. ALEXANDER: Sure.
MR. CONWAY: How close are you?
MR. ALEXANDER: I'm pretty close actually, so if we take a break right now, hopefully I can cut some stuff we've already covered. I think I'm close.
MR. CONWAY: Thanks.
(Recess taken.)
Q. Dr. Makhija, you understand you are still under oath.
A. Yes, I do.
Q. Okay. Did you make any effort to identify the actual out-of-pocket expenditures which could be incurred by AEP during the term of this ESP to satisfy AEP-Ohio's POLR obligation?
A. I did not because I believed that the nature of the cost is a liability which is incurred

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at the beginning of the ESP.
Q. Do you have any opinion as to the appropriate categories of actual expenditures that could be related to POLR risk?
A. In an ex post sense there would be some costs put in, the largest of which I would assume could be revenue losses.
Q. Any others?
A. That would be the biggest item given the nature of the option. But, of course, you have to remember that what is actually realized may have no consequence to the liability taken on because, after all, winners and losers will emerge.
Q. But you're not opining in this case as to the actual out-of-pocket expenditures which AEP might have to make.
A. I'm not, nor do I believe it's the correct way to estimate the cost incurred by the company.
Q. Let's look at page 3, lines 5 to 7, particularly the first sentence and the phrase "costs that the utility bears." When you say "costs," are you still defining this as the market value of the option received by customers?

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A. And, consequently, the liability created for the company.
Q. So it would be yes, and?
A. Yes.
Q. And that market based valuation of the option received by customers that's created by the Black model would include the lost revenue to AEP, correct?
A. It tries to -- yes, it tries to estimate the potential revenue losses that might occur given the nature of volatility and the other market conditions that prevail.
Q. Now, on line 6 you use the words "value of the options."
A. Yes.
Q. When you say "value of the options," do you mean the estimated market value of the options or the subjective consumer surplus received by AEP's customers?
A. I'm referring to the estimated market value of the POLR options provided to the customers.
Q. Just to be clear, do you understand what I mean when I say "consumer surplus"?
A. Yes. The consumer surplus I presume you

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are referring to is what is the beneficial value that customers perceive versus the market value of what they are paying for.

Q. Sure.

A. Yeah.

Q. If I was selling bottles of water for a dollar and you valued a bottle of water at $5 yet only had to pay a dollar, your consumer surplus would be --

A. $4, yeah.

Q. And you would agree that customers may value their ability to shop differently?

A. Yes.

Q. And the Black model doesn't attempt to evaluate customer surplus.

A. No, it does not.

Q. Would you agree with the statement that options, when exercised, are basically zero sum and the cost to the supplier equals the value to the purchaser?

A. That's one -- yes, that is the premise of my principles here, that what is given to customers is automatically at a cost to someone who gave it and, therefore, a liability to the company.

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Q. Now, please note that I said options, when exercised, are zero sum.

A. Oh, sorry. I stand corrected.

Yes, they are zero sum in the sense that whatever is a loss to one party becomes a gain to the other party, but remember that does not speak to the value of the options, it's simply the ex post to win versus loss.

Q. And on an ex-post basis an option which is not exercised would potentially not be zero sum. There's a double negative in there, so let me rephrase the question.

A. Yeah.

Q. If an option is not exercised, then that means that I have paid to receive the option, yet the option did not finish in the money and so I did not get any ex-post benefit from the option, correct?

A. Yeah. It turned out, it turned out ex post, that you were a loser, but of course in the anticipated sense you did not step into it with that expectation, it just transpired so.

Q. Sure. So in that case, an out-of-the-money option, I paid and the seller of the option took that payment and our respective benefits

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are not necessarily a zero sum gain because -- strike that.

Are there any actual costs faced by a seller of an option if an option is not exercised?

MR. CONWAY: Are you talking ex post or ex ante now?

MR. ALEXANDER: Ex post.

MR. CONWAY: Okay.

Q. Let me rephrase the question so it's clear in the record. On an ex post basis are there any actual costs faced by the seller of an option if the option is not exercised?

A. No.

MR. CONWAY: They might have had to pay the lawyer to write the option. We've got to get paid no matter what, right?

MR. ALEXANDER: I have no comment on the record.

Q. In your testimony you also work as a professor of finance at Ohio State; is that correct?

A. Yes, I do.

Q. And as part of that position are you generally familiar with balance sheets and income statements and --

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A. Yes, I am.

Q. And you actually testify regarding accounting standards in this case at page 4, lines 4 through 12; isn't that correct?

MR. CONWAY: Page 4?

Q. In particular I'd direct your attention to lines 8 through 12.

A. Yes.

Q. At several places in your testimony you refer to the POLR option provided to customers as a liability to AEP, correct?

A. Correct.

Q. And you personally consider AEP's POLR obligation to be a liability, correct?

A. Correct.

Q. Do you have an opinion as to whether it's a liability for GAAP purposes?

A. It may not be for GAAP purposes.

Q. Do you have an opinion as to whether it is a liability as it would be defined by the International Accounting Standards Board?

A. Actually, I have to take this under advisement. I'm not sure at this moment as to the accounting treatment that should be accorded to POLR

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obligations.
Q. Do you know if AEP's financial statements reflect the POLR obligation as a liability in the amount AEP has proposed in this case?
A. To the best of my recall, I don't think it does.
Q. Do you think it should? Let me strike that.
Do you think AEP's financial statements should reflect the POLR obligation as a liability?
A. I think it is an item deserving to be in the footnotes because it is indeed ultimately a liability for shareholders.
Q. Please correct me if I'm wrong, but you define liability both as out-of-pocket expense of the company and the lost opportunity to sell electricity at an SSO rate, correct?
A. In an anticipated sense, yes.
Q. How would you define the word "asset"?
A. In the context in which I have used it here "asset" refers to those items that can generate subsequent cash flow for the company.
Q. Would you consider AEP's ability to offer a standard service offer to customers in its service

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territory to be an asset?
A. In an economic sense it is an asset.
Q. And would you consider the revenue which AEP has projected to receive without shopping to be an asset to AEP?
A. Correct.
Q. What happens on a balance sheet when an asset has decreased in value and is marked to market?
A. Could you please explain that question a little bit more? Are you looking for the economic consequences? Are you looking for balance sheet adjustments? Could you please tell me --
Q. I'd like to know what happens on the balance sheet. Just on the balance sheet itself. Am I correct in saying that the asset is reduced in value and owner's equity is reduced by a corresponding amount?
A. Correct. Yes.
Q. And if an asset decreases in value, then equity would be decreased even though no liability is ever created.
A. That's true.
Q. So at line 9 when you say "If the liabilities are increased," you're not necessarily

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saying that a liability was ever created here. You are also saying that an asset, the ability to receive revenue from customers which you've defined as an asset, may have decreased in value.
A. Okay. So in this particular context I must offer a clarification then because I was comparing two companies that were identical except one took on a POLR obligation. So in that sense the example freezes the relative assets of the two companies to be the same.
Given that they have the same assets but one takes on a liability that the other did not, then the rules of conservation of value, which is now fixed by the assets because, as we said, assets are defined in value in terms of the revenue or cash flow that is attributed to them, so that fixes the value on the asset side. Now the question is on the right-hand side of this value based or market based valuation if a liability is added in one case, then it must come at a diminution of the equity because the asset side is fixed in value.
Q. Does anything happen on a balance sheet when an unfavorable regulation is passed by a governmental entity?

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A. I could see some cases where potential losses could be recognized as a result of regulatory change.
Q. So under your definition of "liability" would an unfavorable statute or regulation then be a liability of AEP's?
A. Yes. To the extent that the POLR obligation is left in place without recovery, it would create an additional liability which would then -- could be recognized as a potential loss.
Q. Well, my question was not limited just to POLR so I'm going to reask it. Under your definition of "liability" would an unfavorable statute or regulation which would lead to decreased revenue for AEP be considered to be a liability of AEP's?
A. Economically, yes.
Q. So you would consider energy efficiency rules to be a liability?
A. It's a matter of semantics in terms of valuation effects. Clearly, added regulations do create a diminution in equity values, but they may be desirable for other reasons, but in terms of their consequence to cash flow certain regulations can be costly in terms of cash flow effects.

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Q. So you would consider energy efficiency regulations to be a liability.

MR. CONWAY: Are you talking -- the question is pretty vague, Counselor. Are you talking about specific energy efficiency regulations that are in place in Ohio or are you just talking in generalities?

MR. ALEXANDER: Generalities.

MR. CONWAY: Okay. And is there a compensation scheme that applies to the energy efficiency regulation or not? Or is it just --

MR. ALEXANDER: I don't want to debate this. It's the witness's definition of "liability." I think he's admitted that this is -- under his definition of "liability" anything that would reduce the value of AEP's projected revenue would be a liability. And energy efficiency standards and peak demand reduction standards would reduce AEP's anticipated revenue.

MR. CONWAY: Well --

MR. ALEXANDER: So I don't think this is particularly controversial.

MR. CONWAY: Well, I object to the form of the question, I think it's vague, and if you think

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you could answer it with the vagueness that is present, you can give it a shot, Dr. Makhija.

A. Well, efficiency could be beneficial to the cash flow of the firm itself, so it's a two-edge sword. On the one hand certain requirements could detract from the cash flow of the firm, in that sense it would be a liability, but on the other hand efficiency improvements can improve the bottom line of the firm and in which case they create an asset. So it's a question of the net in that case.

Q. In your testimony at page 3, line 18 you claim that if a utility facing POLR risk is not provided cost recovery, then the utility shareholders, quote, "will see a diminution in their equity value," correct?

A. Yes.

Q. And how long would it take for a denial of cost recovery to effect equity value?

A. In efficient markets the moment such news is available to the market the equity would see a diminution.

Q. And do you believe that the markets for equity in -- and do you believe that the market for AEP's equity is efficient?

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A. My presumption is to start with the acceptance of market efficiency, yes.

Q. And if AEP's POLR risk was increased substantially, how long would it take to reflect that increased risk in equity value?

A. I believe the effect would be immediate as the market recognizes that information.

Q. Did you conduct any empirical studies to determine if POLR risk will result in a diminution in equity?

A. I did not.

Q. And are you aware of any empirical evidence supporting the contention that POLR risk will result in a diminution in equity?

A. I'm not aware, and I'm also not sanguine about such studies given that such POLR obligations are unique to some companies in Ohio.

Q. Did you examine the equity value of Ohio utilities before and after the POLR obligation was created to test the validity of your theory?

A. No, I did not.

Q. And did you examine the impact of the Ohio Supreme Court's recent decision remanding the POLR charge to the PUCO to test the validity of your

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theory?

A. I did not conduct such a study.

Q. The Ohio Supreme Court issued its decision, which you said you reviewed, on April 19, 2011; isn't that correct?

A. Yes.

Q. And you have reviewed that decision?

A. I've read it.

Q. And I'm not going to ask you about the legal analysis in that decision, but is it your understanding that the decision reversed the Commission's decision awarding AEP the POLR charge and remanded it for further proceedings?

A. Yes.

Q. And would it be fair for me to say that the court's decision raised some questions regarding AEP-Ohio's POLR charge?

A. Again, not speaking as a lawyer, my understanding of what I read is that the Supreme Court asked the PUC to reconsider the basis for the POLR recovery provided to AEP companies. It does not -- it does not say, to my reading of it, that these charges are inappropriate in any way.

Q. Sure. And, Dr. Makhija, I'm going to

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stop you because I don't need to get into your legal analysis here; I think it's unfair with you not being a lawyer.

MR. CONWAY: Objection. He said he was giving it based on his personal --

MR. ALEXANDER: Sure. And I'm just letting him know that he can --

MR. CONWAY: -- reading of it. He's not trying to give a legal analysis of it.

Could you read the question back?

(Record read.)

MR. CONWAY: So he's just responding to the question does it raise some questions which implicitly calls for him to explain what he thought the questions are it raised or didn't raise. But if you want to continue on, that's fine with me.

MR. ALEXANDER: Yeah. I just don't need to go into any detail here.

Q. (By Mr. Alexander) Based on your theory that the denial of POLR recovery would cause a decrease in equity value, would you have expected the Supreme Court's decision to cause a decrease in the value of AEP-Ohio's -- excuse me, AEP's stock price?

A. This is what I was trying to explain,

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that my reading of the Supreme Court opinion was not a denial of POLR recovery, and this is one reason I did not consider looking at the stock price diminution of equity value, because all the opinion said is that the basis for the recovery ought to be reconsidered, which is not equivalent of any denial of POLR recovery. And I'm not sure that a test based around that opinion would be an appropriate test of the diminution of equity value as suggested in my testimony.

Perhaps if the PUC, for whatever reason, does not agree that a liability has been created and subsequently it denies POLR recovery, then such a test may be feasible at that point. I hope it doesn't come to that.

Q. So you don't think the court's decision would have had any impact on the equity value of the company as you've described the analysis on page 4, lines 8 through 12?

A. Because the Supreme Court did not say that these are inappropriate. All I understand it said is that the basis for it ought to be reexamined, which is not to say that the amounts or any of these are inappropriate.

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Q. And you haven't looked at the value of AEP's stock price.

A. No, I did not, because I don't believe it's an appropriate test.

Q. If you were valuing AEP using the same classical model that you've been discussing throughout your testimony today, would the value have changed at all as a result of the Supreme Court's decision on April 19, 2011?

MR. CONWAY: When we started this deposition, your convention that you laid out was that when you're talking -- when you use the word "AEP," you're talking about AEP -- what I would call AEP-Ohio, but now I'm not sure that you're referring to AEP-Ohio.

MR. ALEXANDER: That's fair.

MR. CONWAY: If you want to clarify it, that would be, I think, helpful.

Q. That's fair. Your counsel correctly pointed out, I did define that as Columbus Southern and Ohio Power, and now I am not referring to that. Now I'm referring to --

A. The stock price.

Q. That is publicly traded on the New York

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Stock Exchange. Do you understand?

A. I do. And to your question, we could try to infer what may have happened to CSP and OPCo by looking at the stock price of AEP, but there are many things going on, I presume, with AEP as a whole and, consequently, even if CSP and OPCo did not suffer or suffered value changes on account of this, it is not necessary that we would easily capture it given that opinion itself was not that these charges are inappropriate and also there is so much more going on with AEP stock.

So for these multiple reasons I'm not sure that that experiment is the best to infer the POLR effects on AEP stock yet.

Q. In your testimony at page 5, lines 5 through 12 you discuss the possibility of hedging POLR risk.

A. Please, which lines?

Q. Lines 5 through 12.

A. Yes.

Q. Now, with that testimony kind of in the back of your mind, why would a company buy or sell an electric forward contract?

A. Perhaps because it does not have

generation of its own.
Q. Or it has excess generation?
A. Possibly.
Q. And how would a rational seller of energy value the energy that they are willing to sell?
A. In all the considerations that would go in forecasting forward prices.
Q. So they would attempt to sell it at the market price.
A. Yes.
Q. And so long as the market price was above their marginal cost of producing that energy, then a rational seller would want to enter into that transaction.
A. Correct.
Q. Do you know how forward contracts for energy are valued? Strike that.
In your testimony at page 5, line 7 you state that ". . . the provider of the hedge would similarly value the optionality provided to customers." As a seller of a forward contract I wouldn't care why a POLR provider was purchasing that forward contract, correct?
A. Correct.



Q. And so you are actually referring to insuring against POLR risk rather than hedging POLR risk through buying or selling forward contracts, correct?
A. Indeed, the statement is the provider of the hedge will similarly value the optionality to customers. The word is the provider of the hedge.
Q. Why would the provider of the hedge care what optionality was provided to AEP's customers?
A. We are discussing here the situation where AEP, instead of taking on the POLR risk itself, turns to a provider and asks them to not only provide perhaps electricity, but also take on the obligation.
Q. So that would be sort of an insurance-based model, correct?
A. Correct.
Q. But if AEP hedged its obligation via forward contracts, buying and selling forward contracts --
A. Yes.
Q. -- then that would not be based on the customers' anticipated value at all, correct? That would be based on the market prices for electricity forward contracts.



A. And who carries now the obligation in this hypothetical that we are going down?
Q. AEP would retain the obligation, but AEP would hedge that obligation through buying and selling forward contracts.
A. Okay. And so the provider at the forward contract, is he now obligated to meet the POLR obligations, meaning customers that want to return have to be provided at the SSO? I'm trying to figure out where does the -- who has to satisfy the optionality.
Q. Just to walk this through a little bit, AEP has the obligation. AEP buys a publicly traded forward contract which are traded on a monthly basis based on, I believe they're based on PJM prices but I may be incorrect about that, for a definite amount of energy. And AEP would have to buy a series of those to hedge its risks.
My only question and the only thing I'm attempting to get you to agree to is that there's a difference between insuring against the risk and the cost of buying electricity forward contracts to hedge against the risk, correct?
A. I'm in agreement with you. I'm just



trying to make sure that I understand where the obligation for POLR continues to lie in your example. Simply by contracting for electricity are we also contracting for the POLR obligation or not? And in the example I seem to understand is we are buying electricity in the future but retaining the POLR obligation.
Q. In your testimony at 7, line 2 to 3 you testify regarding ex-ante and ex-post costs.
A. Yes.
Q. You and I have been using those phrases throughout today but could you give me your definitions for ex ante and ex post?
A. Ex ante is what we expect will transpire, and ex post is what we realized in actuality.
Q. Is it possible on an ex ante basis to know for certain whether the market price will drop below the SSO price?
A. In the very nature of ex ante is that we don't know.
Q. And would the evaluation of risk of loss on an ex ante basis be similar to an insurance product like fire insurance?
A. It's comparable, yes.

Q. And you would object to looking at AEP's historical shopping data because that would be evaluating loss on an ex post basis, correct?
A. Correct. Although that can be informative, but it should not be the basis for developing the ex-ante cost. For that the model does a pretty good job because it contains in it the variables that would lead to the valuation of the optionality going forward, for example, in particular the volatility measure, the maturity measure, these are all trying to get valuation of the expected costs that might come about.
Q. And you said historic shopping could be informative. Do you belief the Commission should consider historic shopping?
A. Not to value the option, of course, because the option is a forward-looking instrument that accommodates the expected costs. But we do see that shopping has been increasing which already tells us that looking at past shopping may be misleading.
Q. And when evaluating risk on an ex ante basis the appropriate way to value that risk is to evaluate the potential loss based on the probability of that loss, correct?



A. Yes.
Q. And have you personally calculated the potential loss for AEP?
A. No.
Q. Does the Black model calculate the potential loss to AEP?
A. Yes, it does. Because when we value the liability, that is an assessment of the potential loss.
Q. And by "loss" you are defining that to include lost revenue that AEP would have received absent shopping.
A. The price differential that occurred because of price volatility, yes, which creates the loss as you mentioned.
Q. Did you examine any other potential ways on an ex ante basis to evaluate AEP's POLR risk?
A. I did not, although I saw a reference to Monte Carlo simulations in the LaCasse testimony.
Q. Are you familiar with Monte Carlo simulations?
A. To some extent, yes.
Q. Have you ever run a Black model?
A. As an academic exercise as part of



learning about the Black model I have, but as I said earlier, I have not applied it in a practical situation.
Q. That would have been in connection with your doctorate, I don't see a year on here. What year was that?
A. I graduated I think in 1980.
Q. So it would have been in 1980 or earlier when you last ran the Black model?
A. Well, I've also taught lots of doctoral seminars over the years and some of them have considered many academic papers involving various option applications, so I've taught in particular the corporate finance seminar which referenced many of these items. And, as I mentioned, I even have a working paper right now that deals with call and put options.
Q. Have you ever run Monte Carlo simulations?
A. Actually, I have. But, again, it's a long time ago because my master's, MBA, is in operations management and a measured item in operations management is the use of simulations including Monte Carlo for various applications like



queueing theory and inventory management.
Q. Do you have any opinion in this case regarding a Monte Carlo value as has been calculated by Dr. LaCasse?
A. No, I don't.
Q. Have you reviewed the details of the modeling that she did?
A. No, I did not.
MR. ALEXANDER: I don't have anything further at this time. Anybody else in person have any questions?
MR. SINENENG: I have no questions.
MR. SMALZ: Maybe just a few very quick questions.

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EXAMINATION

By Mr. Smalz:
Q. Dr. Makhija, do you consider yourself an expert on the Black model?
A. I consider that I have sufficient familiarity to opine on it in this context.
Q. And have you reviewed any economic literature regarding the validity of the Black model?
A. I'm aware that the Black model is perhaps





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one of the most widely used models for application for commodity options.

Q. And have you reviewed any economic literature critical of the accuracy or validity of the Black model?

A. No.

Q. Are you aware of any such literature?

A. The literature is so vast that I'm sure there might be some papers that deal with that, but none come to mind.

Q. I see.

Dr. Makhija, and I apologize in advance if I'm somewhat awkward in articulating this question, but I recall that in one of your earlier answers this morning you talked about there being winners and losers ex post facto in terms of the actual cost as opposed to the ex-ante cost. Do you recall that this morning?

A. Yes, I do.

Q. In light of that possibility is it also possible that in this context that AEP could be a winner as a result of the POLR revenues ex post facto?

A. It's possible.

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Q. I understand that you were also a witness in the earlier ESP case, 917 and 918 case; is that correct?

A. These are referring to the remand case?

Q. No, the original case back that established the ESP for 2009 --

A. Only in the context of the SEET, yes.

Q. Only in the context of the SEET, I see. Okay.

Are you aware that in 2009 when the ESP was in effect, the earlier ESP, that Columbus Southern Power was, at least under one survey, rated the most profitable electric utility in the country?

A. I'll take your word for it.

Q. In light of that would you characterize AEP as an ex post facto for that year, 2009? Excuse me. Let me correct that. Would you characterize Columbus Southern Power as a winner?

A. Well, you know, I was involved in the 2009 SEET proceedings and my own conclusion was that the earnings were not excessive, so I would not, therefore, classify it as necessarily a winner and, particularly, I would not make a connection between that and POLR obligations.

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Q. Okay. Turning to the Black model itself, is there any precedent for using the Black model to calculate a POLR option for utilities?

A. The situation is completely befitting the use of the Black model, but I'm not aware that such POLR obligations are widespread and, therefore, we should be looking for the application of the Black model in this context.

Q. And are you aware of any economic literature analyzing the utility of the Black model in this context?

A. No.

Q. Now, at several points in your testimony you talk about the migration risk to AEP because of the ability of customers to shop. Is AEP the only company that bears a migration risk, only utility company?

A. If the question is whether they are the only one that have the POLR obligation, I believe other companies may have POLR obligations too.

Q. Now turning to the CRES providers, do they have a migration risk?

A. I believe they don't take on the POLR obligation. They may have a competitive risk of

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customers coming and going, but they don't have the obligation that is pivotal here of serving the returning customers at an SSO price.

Q. But they do have a risk of customers leaving.

A. All businesses do.

Q. Okay. Now, my understanding is that in the Black model as used in this context strike price is the SSO price; is that correct?

A. Correct.

Q. Now, to the extent that that strike price is unpredictable or it may vary, how does that affect the Black calculation, Black model calculation?

A. Correct. So there are two aspects to consider in this situation. The first, of course, is that models are our best help to capturing complex reality, and models do not have to be an exact replica of what reality is. In fact, in economics we always refer to whether we are catching the essence of reality. So in that sense the Black model is very vitally used because it seemed to do a pretty good job of catching optionality.

The second effect is that when the Black model is, in fact, applied and the strike price is perhaps changing over time, the method of implementation can take that into account. And while I'm not conversant with the exact implementation details of what Witness Thomas has done, my presumption would be that their application would allow for changing SSO prices or strike prices over the life of the option.

Q. Now, are you aware that AEP's SSO price will include a number of riders?

A. Do you want to mention one of these riders so I can respond in context?

Q. Well, there are quite a few of them, but let's start with the fuel adjustment clause, the FAC rider.

A. Yes. And what's the question?

Q. To the extent that these riders are unpredictable, does that affect the validity of the Black model calculation?

A. I'm trying to relate the items back to the inputs that go into the Black model and to the extent that the volatility and the benchmark prices would take into account the changing prices of electricity on account of changes in fuel costs, I assume at least in part the models are automatically



taking that into account.

But your question was also about the strike price being -- changing, and the model really looks at the anticipated, so I presume that the expected strike price is not changing. I'm not sure that it would harm the application of the model.

Q. Just assume hypothetically that the rider's increased by, say increase the SSO price by, say, just throw this out, by 10 percent beyond the original strike price calculation. How would that affect the accuracy of the Black model calculation?

MR. CONWAY: So your hypothetical is, instead of a strike price of X it turns out, because of the operation of riders, that the strike price, in fact, is 110 percent of X?

MR. SMALZ: Yes.

MR. CONWAY: Okay.

A. And would these riders also feed into the benchmark market price as well?

Q. I'll ask you that. Would they?

A. Well, I mean, the example you gave me seemed to suggest that it might re-create a similar differential in the benchmark market price as well. One thing you would be interested in is the



differential, so if you raise the strike price, but you do the same thing to the benchmark price by a hard-wired process on both sides, I don't know if it affects the application of the model.

Q. What if there are riders that disproportionately affect AEP, for example, environmental carrying costs?

A. Well, you know, as I said earlier, these models are our best friends in capturing complex reality. Do they do them exactly and accurately? They are models, after all, and they are our best help under the circumstances. So sometimes it's a question of do you throw the baby out with the bath water if the model does not exactly fit your reality.

As it turns out, the applications that I'm hearing about are somewhat conservative so there may be some countervailing discrepancies from reality and the application of the model, but applying, for example, a European model instead of an American model has already given a conservative value, so there are mechanisms to apply the model in a conservative sense so that these discrepancies from reality are subsumed.

Q. I don't want to get sidetracked with the



discussion of the European versus the American model, but would your assumption that the European model underestimates the POLR cost applied even if the maturities under the European model extend beyond the ESP time period?

A. So my statement was narrowly that if you gave me two options of equivalent maturity, and other conditions the same, then the European option is worth less than the American option.

Q. So it's dependent on that assumption --

A. Of maturity.

Q. Whether that assumption is accurate not.

A. Yeah. And in either case, if you extend the maturity by equivalent amounts, the statement would hold true.

Q. I see.

A. There is a benefit by using the European option. Of course, it's a conservative estimate in this case, but it also provides a mechanism to apply the protocol parity, because the protocol parity applies to European options. So there are certain benefits of going down that path since we were talking about trying to capture reality as best as we could with the models that are available and the

state of the art.
Q. Does the Black model in the context of this case take account of any transaction costs that customers may have in deciding whether to shop or not?
A. No, because it only measures the value of the optionality, but not the costs that would go. In my own opinion, given that the electricity is a commodity, I'm not sure how many other transactional costs would be, you know, incurred in such transfers.
Q. Do you think individual residential utility customers are routinely reviewing market prices?
A. Well, there's certainly lots of CRES providers that are reminding them of that.
Q. I see.
Does the Black model assume that, the Black model in this context again, assume that all the customers of AEP-Ohio have the ability to shop?
A. I think so, yes.
Q. And could the validity of the Black model calculation be effective if some of those customers are not able to shop?
A. Actually, I take back my original answer



because the way I understand the Black model as applied by Witness Thomas, it takes into account the constraints, some of which we discussed earlier, the constraints dealing with residential customers who come in during the summer months, et cetera, or industrial customers who return must take for 12 months, so those kinds of constraints have been taken into account I believe.
Q. To your knowledge, does the model take into account the inability of some customers to shop at all?
A. So I'm thinking about the implementation procedures that would be adopted, one could apply the model to all customers or it could apply it to only those that have the POLR opportunity. So if there's a group of customers that, for whatever reason, can not and may not do any moves, then in some sense they don't have the POLR opportunity optionality.
But we should be careful that they may, even though they individually may not have that opportunity, maybe somebody else can aggregate them and provide them that opportunity. So I'm not aware of those, you know, those mechanisms that might create optionality for customers that at first seem



not to have it themselves.
Q. And you are not aware -- strike that.
Do you know if the Black model calculation as done, or as explained anyway, by Witness Thomas takes into account the inability of any customers to shop at all?
A. It's an implementation question I don't know if she got into or not.
Q. I see.
Again, I'm hoping I'm paraphrasing your earlier testimony correctly and not botching it, but I believe you earlier testified about the use of a, quote/unquote, binomial formulation of the Black model to accommodate variations in the strike price. To your knowledge, has AEP done a binomial formulation?
A. I would presume so because most valuations of the Black-Scholes are actually done through the binomial application. I cannot be certain, but I believe so.
Q. But you don't know as a fact, do you?
A. Actually, I think they have because I've seen the rebuttal testimony and in that I see the binomial trees, so I presume they have, yeah.



MR. SMALZ: I have no further questions. Thank you, Dr. Makhija.
THE WITNESS: Thank you.
MR. ALEXANDER: Let's go off the record for just one moment.
(Discussion off the record.)
MR. ALEXANDER: Dr. Makhija, I think that's all the questions we have today. Thank you.
THE WITNESS: Thank you.
MR. CONWAY: We will not waive signature.
(The deposition concluded at 11:37 a.m.)
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State of Ohio :
: SS:
County of ________________ :

I, Anil Kumar Makhija, PhD, do hereby certify that I have read the foregoing transcript of my deposition given on Wednesday, July 27, 2011; that together with the correction page attached hereto noting changes in form or substance, if any, it is true and correct.

______________________________
Anil Kumar Makhija, PhD

I do hereby certify that the foregoing transcript of the deposition of Anil Kumar Makhija, PhD was submitted to the witness for reading and signing; that after he had stated to the undersigned Notary Public that he had read and examined his deposition, he signed the same in my presence on the _______ day of __________________, 2011.

__________________________
Notary Public

My commission expires _______________, _______.

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CERTIFICATE

State of Ohio :
: SS:
County of Franklin :

I, Maria DiPaolo Jones, Notary Public in and for the State of Ohio, duly commissioned and qualified, certify that the within named Anil Kumar Makhija, PhD was by me duly sworn to testify to the whole truth in the cause aforesaid; that the testimony was taken down by me in stenotypy in the presence of said witness, afterwards transcribed upon a computer; that the foregoing is a true and correct transcript of the testimony given by said witness taken at the time and place in the foregoing caption specified and completed without adjournment.

I certify that I am not a relative, employee, or attorney of any of the parties hereto, or of any attorney or counsel employed by the parties, or financially interested in the action.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal of office at Columbus, Ohio, on this 28th day of July, 2011.

______________________________
Maria DiPaolo Jones, Registered
Diplomate Reporter, CRR and
Notary Public in and for the
State of Ohio.

My commission expires June 19, 2016.
(MDJ-3874)

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