Exhibit No.: 300
Issue: Ameren IRP
Deponent: Matthew Michels
Type of Exhibit: Rebuttal
Sponsoring Party: MO Landowners Alliance
Case No.: EA-2014-0207
Date of Deposition: July 10, 2014

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. EA-2014-0207

DEPOSITION OF MATTHEW MICHELS

ON BEHALF OF

MISSOURI LANDOWNERS ALLIANCE

September 15, 2014

List of Portions of Deposition of Matthew Michels
To Be Offered Into Evidence

Pages 1-18
Page 22, lines 1-14
Page 23, lines 2-15
Page 23, line 23 – page 25, line 21
Page 26, line 5 – page 27, line 15
Page 29, line 22 – page 31, line 8
Page 34, line 15 – page 36, line 11
Page 38, line 24 – page 40, line 15
Page 41, line 14 – page 43, line 14
Page 43, line 20 – page 44, line 9
Page 46, line 21 – page 48, line 4
Page 48, line 11 – page 50, line 5
Page 52, line 24 – page 54, line 6
Page 63, lines 2 – 22
Pages 67 (errata sheets)
Deposition Exhibits A through E (other than Figures 5.7 & 5.8 at page 32, Chapter 5 of Exhibit A, which were color-coded in the original document).

MIDWEST LITIGATION SERVICES
COURT REPORTING & VIDEO

COPY

BEFORE THE PUBLIC SERVICE COMMISSION OF THE STATE OF MISSOURI

IN THE MATTER OF THE APPLICATION OF GRAIN BELT EXPRESS CLEAN LINE LLC FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY AUTHORIZING IT TO CONSTRUCT, OWN, OPERATE, CONTROL, MANAGE, AND MAINTAIN A HIGH VOLTAGE, DIRECT CURRENT TRANSMISSION LINE AND AN ASSOCIATED CONVERTER STATION PROVIDING AN INTERCONNECTION ON THE MAYWOOD-MONTGOMERY 345 KV TRANSMISSION LINE

Case No. EA-2014-0207

DEPOSITION OF MATTHEW ~~MICHALES~~ MICHELS

JULY 10, 2014

NATIONWIDE SCHEDULING

OFFICES

MISSOURI Springfield Jefferson City Kansas City Columbia Rolla Cape Girardeau
KANSAS Overland Park ILLINOIS Springfield Champaign

HEADQUARTERS: 711 North Eleventh Street, ST. Louis, Missouri 63101
800.280.3376
www.midwestlitigation.com

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

IN THE MATTER OF THE APPLICATION OF GRAIN BELT EXPRESS CLEAN LINE LLC FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY AUTHORIZING IT TO CONSTRUCT, OWN, OPERATE, CONTROL, MANAGE, AND MAINTAIN A HIGH VOLTAGE, DIRECT CURRENT TRANSMISSION LINE AND AN ASSOCIATED CONVERTER STATION PROVIDING AN INTERCONNECTION ON THE MAYWOOD-MONTGOMERY 345 KV TRANSMISSION LINE

Case No. EA-2014-0207

DEPOSITION OF MATTHEW ~~MICHAELS~~ MICHELS
Taken on behalf of the Missouri Landowners Alliance
July 10, 2014

Jo Ann Dickson, CCR 1085

(Whereupon, the deposition commenced at 9:20 a.m.)

EXHIBITS

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

IN THE MATTER OF THE APPLICATION OF GRAIN BELT EXPRESS CLEAN LINE LLC FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY AUTHORIZING IT TO CONSTRUCT, OWN, OPERATE, CONTROL, MANAGE, AND MAINTAIN A HIGH VOLTAGE, DIRECT CURRENT TRANSMISSION LINE AND AN ASSOCIATED CONVERTER STATION PROVIDING AN INTERCONNECTION ON THE MAYWOOD-MONTGOMERY 345 KV TRANSMISSION LINE

CASE NO. EA-2014-0207

MATTHEW MICHELS

DEPOSITION OF WITNESS, ~~MICHAEL MATTHEWS~~,

produced, sworn, and examined on the 10th day of July, 2014, between the hours of 9:20 a.m. and 11:25 a.m. of that day, at 1901 Chouteau Avenue, before JO ANN DICKSON, Certified Court Reporter within and for the State of Missouri, in a certain cause now pending before the Public Service Commission of the State of Missouri.

A P P E A R A N C E S

For Missouri Landowners Alliance:
Paul A. Agathen
Paul A. Agathen, Attorney at Law
485 Oak Field Court
Washington, Missouri 63090
(636) 980-6403

For Clean Line Energy:
Andy Zellers
Dentons US LLP
4520 Main Street, Suite 1100
Kansas City, Missouri 64111
(816) 460-2616

For the Witness:
Thomas M. Byrne
General Counsel Ameren
1901 Chouteau Avenue
St. Louis, Missouri 63103
(314) 554-2514

Telephonically for Missouri Public Service Commission:
Whitney Hampton
Bob Berlin
Steve Dottheim
Alex Antal
Missouri Public Service Commission
200 Madison Street
Jefferson City, Missouri 65102
(573) 751-6651

Telephonically for IBEW Local 2, 53 & 1439:
Emily Perez
Hammond & Shinners, P.C.
7730 Carondelet Avenue, Suite 200
St. Louis, Missouri 63105
(314) 727-1015

Telephonically for Sierra Club
Henry B. Robertson
Great Rivers Environmental Law Center
319 North Fourth Street, Suite 800
St. Louis, Missouri 63102
(314) 231-4181
Telephonically for Show Me Concerned
Landowners & Farm Bureau:

Terry M. Jarrett
Healy & Healy
514 East High Street, Suite 22
Jefferson City, Missouri 65101
(573) 415-8379

The Court Reporter:

Ms. Jo Ann Dickson
Midwest Litigation Services
711 North Eleventh Street
St. Louis, Missouri 63101
(314) 644-2191

ALSO PRESENT:
DAVID LINTON
ADHAR JOHNSON
TELEPHONICALLY: GARY DRAG
TELEPHONICALLY: ERIN SZALKOWSKI
TELEPHONICALLY: JIM KNEE

IT IS HEREBY STIPULATED AND AGREED, by and between counsel that the deposition of ~~MICHAEL MATTHEWS~~ MATTHEW MICHELS may be taken in shorthand by Jo Ann Dickson, a certified shorthand reporter, and afterwards transcribed into typewriting; and the signature of the witness is expressly reserved.

* * * * *

(Thereupon, Exhibit A-E were marked for identification.)

~~MICHAEL MATTHEWS,~~ MATTHEW MICHELS of lawful age, being produced, sworn and examined and deposes and says:

MR. AGATHEN: I'd like to get appearances for the people who are present here. My name is Paul Agathen, A-G-A-T-H-E-N. I represent the Missouri landowners Alliance. Phone number (636) 980-6403.

Can everybody hear me on the telephone lines? I'll take that to mean yes.

UNIDENTIFIED MALE SPEAKER: It is difficult to hear you.

MR. AGATHEN: Okay. I will speak up and see if we can adjust the phone a little bit. Anyone else present here?

MR. BYRNE: Sure. I'm Tom Byrne representing Ameren Missouri, and my phone number is (314) 554-2514.

MS. JOHNSON: I'm Adhar Johnson, A-D-H-A-R, Johnson, Clean Line Energy, (314) 477-1211.

MR. ZELLERS: I'm Andy Zellers with Dentons US LLP and I'm representing Clean Line Energy Partners. My phone number is (816) 460-2616.

MR. LINTON: My name is David Linton. I'm representing United for Missouri. My phone number is (314) 341-5769.

MR. AGATHEN: That's it for the people present here. I just note for the record that before we went on the record, the court reporter took the names and phone numbers of those who have decided to attend by telephone.

If there's no objections from any of those on the telephone lines, I will just have her enter the appearances as you gave them to her before we went on the record. Is that okay with everybody? Any objections?

MS. HAMPTON: Yes, that's fine. No objection from staff. Thank you.

MR. AGATHEN: Before we go any further, I would ask the court reporter to attach to the deposition, make a part of it, the notice to take deposition consisting of two pages, the second one being the certificate of service.

DIRECT EXAMINATION

BY MR. AGATHEN:

Q Could you state your name for the record, please.

A My name is Matthew ~~Michaels.~~ michels.

Q Could you summarize for the record your educational background after high school.

A I hold a bachelor's of science in electrical engineering from the University of Illinois in 1990.

Q And what has been your employment history since graduating from college?

A I was employed with Illinois Power starting in June 1990 and worked there until Illinois Power was acquired by Ameren in October of 2004 and subsequently worked with Ameren in corporate planning.

MS. HAMPTON: This is Whitney Hampton with the CRC. It's really difficult to hear what's being said.

BY MR. AGATHEN:

Q Speak up just a little if you could.

A Okay. I worked in corporate planning from the time that Ameren acquired Illinois Power in 2004.

Q And are you currently employed by Ameren?

A Yes, I am.

Q What are your general duties, job description generally of what you're doing at this point?

A My duties include planning related functions

associated with generation and resources, including integrated resource planning, fuel budgeting and various analyses for changes to resources.

Q If I ask you a question that either you or your attorney Tom thinks the answer is confidential, I want to make sure you let me know.

A I will.

Q Has Ameren filed several documents with the Missouri Public Service Commission over the past several years which addressed which are called integrated resource plans?

A Yes, we have.

Q Is there an acronym? I'm not familiar with this. Is there an abbreviated name you give to the term integrated resource plan?

A We call it IRP.

Q IRP?

A Yes.

Q So for the record if we use the term IRP we'll be talking about integrated resource plans.

A Fine.

Q I'm going to show you a document consisting of several hundred pages and it looks to be about three inches thick. Is that Ameren's IRP which was filed with the Missouri Public Service Commission for the year 2011?

MR. ZELLERS: This is Andy Zellers. I'm going to go ahead and make an objection for the record. This is a hundreds of pages long document. It's not possible for him to authenticate this in just a few minutes while he's sitting here.

THE WITNESS: This does appear to be our 2011 IRP filed with the Missouri Public Service Commission.

BY MR. AGATHEN:

Q Thank you. And was this document a subject before the proceeding before the commission, a formal proceeding which involved hearings and I guess input from various parties?

A Yes.

MR. ZELLERS: This is Andy Zellers. I'm going to object one more time that the proper foundation has not been laid for that document.

BY MR. AGATHEN:

Q You're generally familiar with the 2011 IRP?

A Yes.

Q How were you involved, if at all, in compiling or working on that IRP?

A I had primary responsibility for directing the activities associated with analysis, assumptions development, report writing, review and filing.

Q Are you still generally involved with the IRP

process at Ameren?

A Yes.

Q Are you familiar with the 2012 and 2013 updates to the IRP?

A Yes.

Q Does your job include any involvement with Ameren's efforts with renewable energy, renewable resources?

A Yes, it does.

Q Could you describe what involvement you might have with that.

A We do a majority of the analysis to support plans for compliance with renewable energy standards and evaluation of the economics of different types of renewable resources in the context of IRP and also renewable energy standard or RES compliance.

Q I'm going to hand to the court reporter and to the parties present here documents which I've marked myself as Exhibits A, B, C, D, and E. And I will hand one to the witness as well.

I'd like you to take a look at Exhibit A if you would. And does that appear to be a cover page and various pages from Ameren's 2011 IRP which was filed with the Missouri Commission?

A Yes, it does.

Q And correct me if I'm wrong, but for numbering purposes on the document the 2011 IRP is divided into various chapters, is it not?

A That's correct.

Q And the chapter number appears up at the top of each page of Exhibit A, is that correct?

A That's correct.

Q For example, the first page after the cover page up near the top says 5, renewable and storage resources. So that would have been from Chapter 5?

A Correct.

Q And then the number down at the bottom, in this case Page 1, that would indicate the page from that particular chapter?

A That's correct.

Q And that's true throughout the document which has been marked as Exhibit A?

A Yes.

Q I'll note that the two wind maps at Page 32 are not color coded, is that correct, Page 32 of Chapter 5?

A That's correct.

Q The original would have been color coded, is that correct?

A Right.

Q Other than that difference do the pages of

Exhibit A correctly -- or strike that.

Are they true and accurate copies of the 2011 IRP which was filed by Ameren with the Commission?

MR. BYRNE: I'm going to object. There's some handwritten notes in there.

BY MR. AGATHEN:

Q Let me add that other than the handwritten notes and the differences in the wind map which I've just noted to the pages from Exhibit A represent true and correct copies of the 2011 IRP which was filed by Ameren with the Commission?

A There are some other charts and figures which were also in color in the original filing that are not here.

Q Okay. Can you tell from looking at this document which are in color and which weren't? Let me ask you this, does it matter what the coloring was other than the wind maps?

MR. ZELLERS: I'm going to object to that question as generally improper. The proper foundation is not being laid for this document. I don't believe the witness is going to have appropriate time to examine every page and ensure that this is a true and correct copy.

THE WITNESS: I'm sorry, can you repeat the question.

BY MR. AGATHEN:

Q Yes. You indicated that some of the originals of these pages at Exhibit A may have been in color. Does the color matter for any of those pages other than the wind maps?

MR. ZELLERS: I'm going to object to that question as well as ambiguous.

THE WITNESS: It depends on the nature of the discussion about those.

BY MR. AGATHEN:

Q Okay. Well, if we get to a point where you think that the color matters, will you tell me?

A I will.

Q Okay. With those exceptions that we've discussed, the coloring and the handwritten notations, do the pages of Exhibit A appear to you to be accurate copies of Ameren's 2011 IRP?

A They appear to be, yes.

MR. ZELLERS: I'm going to renew my objection. The proper foundation has not been laid here.

BY MR. AGATHEN:

Q While we're at it, I'm going to hand out -- I've already handed them out, have I not, copies to everybody of exhibits B, C, D and E.

Okay. Mr. Michaels, looking at Exhibit B does

that appear to be an accurate copy cover page and various pages from Ameren's 2013 update of its IRP which was filed with the Missouri Commission?

A Yes, it does.

MR. ZELLERS: I'm going to object to this exhibit as well. This is another lengthy document that appears to have some handwritten notes that I don't believe could have been possibly part of the copy made of the web page or wherever this came from. So the objection is improper foundation.

BY MR. AGATHEN:

Q Let me ask this a different way then. Other than handwritten notations, does the document which has been marked as Exhibit B appear to you to be true and correct copies of portions of Ameren's 2013 IRP update?

A It does appear to be.

MR. ZELLERS: I'm going to renew that objection, improper foundation.

BY MR. AGATHEN:

Q Are you generally familiar with what's called FERC Form 1, F-E-R-C all caps, FERC Form 1?

A I am generally familiar.

Q Do you have a copy of Exhibit C in front of you?

A I do.

Q Does that appear to be the cover page and one, two, three, four, five, and six other pages of Ameren's submission to the federal energy regulatory commission on FERC Form 1 for the year ending 2013?

A Yes, it does.

MR. ZELLERS: I'm going to object to this exhibit as well on the grounds of improper foundation and that the witness has expressed no other familiarity with this document, any background with it, any familiarity with its preparation.

MR. BYRNE: I guess I'm going to object because it's identified on the front as Union Electric Company, not Ameren's FERC Form 1 filing, so perhaps --

BY MR. AGATHEN:

Q Let me rephrase the question then. Does Exhibit C appear to be Union, copies of portions of Union Electric Company's FERC Form 1 which was filed with the FERC for the year 2013?

A Yes.

MR. ZELLERS: I'm going to renew my objection to that question as well, improper foundation.

BY MR. AGATHEN:

Q Do you have a copy of Exhibit D in front of you?

A Yes, I do.

Q Are you generally familiar with the stipulation and agreement which was filed by Ameren or Union Electric with the Missouri Public Service Commission in file number ET-2014-0085?

A Yes, I am.

Q Does Exhibit D appear to be the first page of the Commission's order approving a stipulation and agreement in that case and then Pages 1, 9 and 10 of the stipulation itself, other than any handwritten notations which were added?

A Yes, it does.

MR. ZELLERS: I'm going to object to this document as well. This is not a document that the witness has prepared. It purports to be a document published by the Missouri Public Service Commission and we don't have anyone here to authenticate that document.

BY MR. AGATHEN:

Q Do you have a copy of Exhibit E in front of you?

A Yes.

Q Are you generally familiar with the renewable energy standard compliance plan which was filed by Ameren in April of 2014 with the Missouri Public Service Commission?

A Yes, I am.

Q Does Exhibit E appear to be the cover page and Pages 5 and 20 of that filing with the Missouri Public Service Commission?

A Other than any handwritten notes, yes.

Q Thank you.

MR. ZELLERS: I'm going to go ahead and object to Exhibit E. Again, improper foundation has been laid. And I'm going to make a general objection to Exhibits A, B, C, D and E in that they have been altered and they're incomplete, improper foundation and they are not the best evidence.

MR. AGATHEN: I'm going to ask the court reporter to attach to the deposition and make a part of the deposition the documents which have been marked as Exhibit A, Exhibit B, Exhibit C, Exhibit D and Exhibit E.

BY MR. AGATHEN:

Q Next series of questions I have are going to deal with pages from Exhibit A. Do you still have a copy of that?

A Yes.

Q Going to Page 2 of Chapter 5, in the first full paragraph, I guess the second paragraph of the document states that one major weakness of wind is its limited availability during summer peak hours. And it goes on to say that to compensate for this weakness, Ameren

Missouri paired wind with peaking resources. Do you see that?

A I do.

Q Does this limited availability create a cost for wind generation which would not exist if wind were more reliable and predictable as a source of energy?

MR. ZELLERS: I'm going to object to that question. There's a pending objection that this is, there's improper foundation for this document. I'm going to renew that objection. And the question assumes facts not in evidence.

BY MR. AGATHEN:

Q Go ahead and answer.

A Could you repeat the question.

Q Sure. Does the limited availability of wind create a cost which would not exist if wind were a more reliable and predictable source of energy?

A It depends on the context in which it's being examined.

Q Wind vis-a-vis typical traditional coal generation or gas fire generation, for example, does the wind create a cost which those traditional sources of generation would not impose on a system such as the need for back-up?

MR. ZELLERS: I'm going to object to that

question as unclear and ambiguous.

THE WITNESS: I'm not sure I understand it.

BY MR. AGATHEN:

Q Okay. I'm trying to compare wind as a source of energy versus traditional coal fired and gas fired sources of energy. The coal fired and gas fired do not have the same problems with predictability and reliability, do they?

A No.

Q So my question is, due to the increased unpredictability and unreliability of wind generation, if you're looking that as a source of energy, will it create an additional cost which the traditional sources of generation would not cause?

MR. ZELLERS: I'm going to object to that.

BY MR. AGATHEN:

Q Such as the need for back-up generation?

MR. ZELLERS: I'm going to object to the form of that question as well as compound as well as leading the witness as well as being ambiguous.

THE WITNESS: It may result in the need for additional cost if the objective is to use it to meet peak demand requirements.

BY MR. AGATHEN:

Q In the sentence we just read you said that to

compensate for the weakness, talking about wind, Ameren Missouri paired wind with peaking resources, do you see that?

A Yes.

Q Could you explain what that means.

A Yes. What we did in the context of our IRP planning was in order to meet peak demand requirements, which is one of the primary objectives of the IRP process, we included simple cycle gas combustion turbine peaking resources with wind resources as a combined resource to compare against the economics of other resources for meeting our resource adequacy needs.

Q And for lack of a better term, is that back-up generation in effect?

A I have heard it referred to that way.

Q Would you need back-up generation if you were looking at adding traditional coal fired generation?

A Not in the same sense that we would expect to need it to meet peak demands requirements with wind.

Q Thank you.

Could you briefly explain what MISO is, M-I-S-O, all caps?

A MISO is the Mid-Continent Independent System Operator which operates the transmission system within, along the MISO participants and also the power markets.

Q If you purchase say 100 megawatts of wind generation, drop the year, does MISO tell you how many megawatts you can use for capacity planning purposes?

A Assuming that the particular wind generation has passed a deliverability test, ~~than~~ then MISO does provide a percentage, a capacity credit that is applied to the nameplate capacity of the wind farm in order to determine what can be used for resource adequacy.

Q And for your 2011 planning purposes was that figure eight percent, do you recall?

A Eight percent I believe is correct.

Q And that's called the capacity value?

A We called it the capacity credit.

Q Capacity credit.

Do you know what capacity credit MISO would assign to traditional sources of generation such as coal?

MR. ZELLERS: I'm going to object to that question. This witness is not an employee of Mid-Continent Independent Systems operator and as such cannot testify to that what entity may decide or not decide to do or may or may not charge its members.

THE WITNESS: MISO establishes the capacity credit for every generation source based on testing and historical operation.

BY MR. AGATHEN:

Q Do you know what approximately that capacity credit would be for traditional coal fired generation?

MR. ZELLERS: I'm going to renew that objection. This witness is not an employee of MISO and this question as well as the previous question calls for speculation as to what a third party who's not represented here may or may not do.

THE WITNESS: Generally for traditional generating resources that capacity credit is going to be much closer to the nameplate rating of the generator than it is for wind.

BY MR. AGATHEN:

Q We're talking over 90 percent?

A It can be.

Q Are you generally familiar with the Missouri state renewable energy standard?

A Yes.

Q And do you have an abbreviated name for that also?

A RES.

Q RES, R-E-S. Thank you.

Would it be fair to say that Ameren's integrated resource plans must factor in and consider the requirement of the RES?

A Yes.

Q And that in determining how to comply with the RES you in turn must factor in the options which you explore in the integrated resource plan?

MR. ZELLERS: I'm going to object to these questions. He's asking questions based on a statute and this witness is not an attorney and is not a legal expert. No foundation has been laid for any expert testimony and this is calling for speculation.

THE WITNESS: Can you repeat the question.

BY MR. AGATHEN:

Q Sure. In determining how to comply with the RES, must you in turn factor in the options which you explore in an integrated resource planning process?

A Generally, yes.

Q So the two are interrelated?

A They are.

Q Looking at Exhibit A near the bottom of Page 1 of Chapter 5, the document essentially says Ameren cannot meet both the 15 percent goal for renewables and also come within the 1 percent rate gap. Is that essentially correct?

A Essentially, yes.

Q Does this mean that the cost of wind energy is estimated by Ameren to be higher than the cost of the

generation that would be used if it were not for the 15 percent renewable requirement?

A Generally, yes.

Q Is that still the case?

A Yes.

Q As part of your resource planning process do you know approximately how many different types and variety of generation sources you looked at?

A Originally it may have been over 50. We narrowed that down to a handful.

Q And you narrowed that down by looking at the costs and the effect of the different types and eliminated those which you thought were not going to be used?

MR. ZELLERS: I'm going to object to that. That's leading the witness. It's also ambiguous.

BY MR. AGATHEN:

Q How did you get from the 50 or so down to the lower number?

A We did multiple screening analyses that included considerations for economics, operations, feasibility, other factors.

Q At the top of Page 32 of Chapter 5, looking again at Exhibit A, it says you used a capacity factor for wind generation of 37.5 percent. Do you see that?

A Yes.

Q Is that an effective composite figure based on data from states listed at the bottom of Page 31 and the top of Page 32?

A Yes, it is.

Q And you also say there at Page 32 that as of 2011 your estimate of the levelized cost of wind generation was 10.81 cents per kilowatt hour, is that correct?

A That's correct.

Q And you normally abbreviate kilowatt hour to KWH?

A Yes, we do.

Q And megawatt hour to MWH?

A Correct.

Q And gigawatt hour, while we're at it, to GWH?

A Right.

Q Is the 10.81 cents per kilowatt hour figure the same as $108 for megawatt hour?

A Yes.

Q Does the figure of 10.81 cents include any component for transmission?

A It would include short run for interconnect to the ~~pole~~ bulk transmission system.

Q When you combine the 10.81 cents with the cost of the necessary back-up capacity you get a levelized cost of 12.44 cents per kilowatt hour for wind, is that correct?

A Are you looking at a particular page? I don't see it.

Q Middle of Page 33, the levelized -- this last sentence in the middle of that, the middle paragraph says the levelized cost of energy for the combined resource is 12.44 cents which is still competitive with the other resources, do you see that?

A Yes.

Q And you get from the 10.81 cents per kilowatt hour to the 12.44 cents by factoring in the back-up capacity which would be needed for wind, do you not?

MR. ZELLERS: I'm going to object again. He's leading the witness.

THE WITNESS: In the way that we combined the two, yes.

BY MR. AGATHEN:

Q Okay. When we talk about the levelized cost of wind in Ameren's estimates at the time being 10.81 cents, would that include, if that were a Kansas wind farm, for example, would that include the cost of the transmission of getting the energy from the Kansas wind farm to the Ameren system?

MR. ZELLERS: Objection, that's been asked and answered.

THE WITNESS: It would not.

BY MR. AGATHEN:

Q Thank you. What piece of transmission, if you know, would be included in the 10.81 cents per kilowatt hour?

A It would include a short run of transmission to connect the wind farm to the ~~bolt~~ bulk transmission system, and I believe our estimate was six miles.

Q Okay. So it includes enough transmission cost to hypothetically connect wind generation to the transmission system if the two were six miles, approximately, apart?

A Correct.

Q Are you familiar with a term wind integration costs?

A I'm familiar with the term.

Q Does that include any cost for ancillary services in the normal use of that term?

MR. ZELLERS: I'm going to object as ambiguous. Being familiar with a term does not necessarily denote expertise in a particular subject area. Improper foundation has been laid for that question.

THE WITNESS: I don't know for sure.

BY MR. AGATHEN:

Q Ameren is presently purchasing wind energy from a facility in far northern Iowa, are they not?

A Correct.

Q Do you know, do you know what county that's located in?

A I think it's in Mitchell County if I remember correctly.

Q Going to Page 34 of Chapter 5 of Exhibit A, the last sentence there, is it correct that Ameren will not need to add any additional renewable energy until 2019 in order to meet its renewable quota?

MR. ZELLERS: I'm going to object to that question. This is ambiguous and again a foundation has not been laid for this witness' expertise in what may be happening in the next five to six years in terms of needs for renewable energy to meet the standard.

THE WITNESS: Can you repeat the question.

BY MR. AGATHEN:

Q Sure. You say there that Ameren Missouri expects to need over 5,000 gigawatt hours of new renewable energy in 2019, right?

MR. BYRNE: Object. It says 500, not 5,000.

BY MR. AGATHEN:

Q I'm sorry, let me start that over. The document near the bottom of Page 34 says Ameren Missouri expects to need over 500 gigawatt hours of new renewable energy in 2019, correct?

A Correct.

Q So do you expect to meet your quota with existing sources of renewable energy up until 2019?

A For the portfolio standard other than solar energy we do.

Q Okay. So you need -- would not need any, for example, sources of nonsolar renewable energy before 2019?

MR. ZELLERS: Objection, that's been asked and answered.

THE WITNESS: Correct.

BY MR. AGATHEN:

Q At that point in 2019, if you add the 500 gigawatt hours of new renewable energy, does Ameren expect to be exceeding the one percent rate cap?

A At the time the 2011 IRP was filed, that was the expectation.

Q Is that still the expectation, do you know?

A The way the one percent rate cap calculation is determined has evolved since the 2011 IRP was filed, but we would still expect that the amount of wind generation in the future that we could acquire under the cap would still be around a few hundred megawatts.

Q Megawatts?

A A few hundred megawatts.

Q And what timeframe are you talking about when

you say that?

A Starting in 2019.

Q Is it true that Ameren is projecting that it will not need any new kind of generating capacity until at least 2021 at the earliest? And for reference I'd point you to Exhibit B, Page 6 of the executive summary, first full paragraph.

A That's correct.

Q So prior to that time, before you add any additional generation, if you purchase additional wind generation it will necessarily be displacing energy from your existing sources of generation, will it not?

MR. ZELLERS: I'm going to object to that question. First of all, it's leading the witness, and second of all it's assuming facts not in evidence, and third of all there's no basis for this witness to be able to testify as to possible displacement of current energy production.

THE WITNESS: I don't know that it would or not replace our other generation.

BY MR. AGATHEN:

Q If you bought X megawatt hours of wind generation next year say and you didn't need it for capacity purposes, will you not necessarily be displacing energy from your existing generation?

MR. ZELLERS: I'm going to object again. This question is highly speculative. He's given no concrete information for this witness to make an informed answer. It's assuming facts not in evidence yet again and we've not laid the proper foundation for this witness to be able to answer a question even if it weren't highly speculative.

THE WITNESS: It wouldn't necessarily because it depends on where the wind is, is it in MISO. All of our generators dispatch into MISO, so it's hard to say whether or not our other generation would be reduced as a result of having additional wind energy.

BY MR. AGATHEN:

Q Okay. Some generation somewhere would necessarily have to be reduced, is that correct?

A Somewhere.

Q And it would depend -- strike that.

Skip over to Exhibit C. Do you have that, a copy of that in front you?

A Yes.

Q If you go to the last two pages, does that show data from Ameren's baseload coal fired plants?

A Yes.

Q It shows data for, on the last page, Rush Island plant, Meramec plant, M-E-R-A-M-E-C, Labadie plant, L-A-B-A-D-I-E, and the Sioux plant, S-I-O-U-X, is that

correct?

A Correct.

Q Looking at the data, for example, from Labadie, if you go to Line 35, do you see that?

A I do.

Q It says expenses per net kilowatt hour.

A Yes.

Q Is that generally referred to as production costs?

A I'm not familiar enough to know the background of what's in this to know for sure.

Q Basically it's a summation of the figures which appear on that same page, is it not?

MR. ZELLERS: I'm going to object. The witness just said that he's not familiar enough to testify as to the contents of this document.

THE WITNESS: I can't be sure what's in that.

BY MR. AGATHEN:

Q Okay. Looking at the figure on Line 35 for Labadie just as an example, there's a figure of .0227. Does that translate to 2.27 cents per kilowatt hour?

MR. ZELLERS: I'm going to object again. This witness has told us under oath that he is not familiar enough with the contents of this document to testify to that.

THE WITNESS: I really don't know. I can't tell what the units are.

BY MR. AGATHEN:

Q Okay. Well, the definition on Line 35 of the document itself says expenses per net kilowatt hour, is that correct?

A That's correct.

Q Okay. Let's leave it at that.

Going back to the bottom of Page 34 of Chapter 5 as shown on Exhibit A --

MR. ZELLERS: Paul, give me just a second here. Tell me again which page we're on.

MR. AGATHEN: Page 34, Chapter 5 of Exhibit A.

BY MR. AGATHEN:

Q You indicate, or the document indicates that Ameren will need almost 4,500 gigawatt hours in the year 2021 to meet the renewable energy requirement for the Missouri RES, is that correct?

A That's correct.

Q Is this 4,500 figure total or is that an additional amount for that year, do you know?

A That's an additional amount.

Q And if hypothetically you were to purchase 4,500 gigawatt hours in the year 2020, would that put you over the one percent rate cap?

MR. ZELLERS: Objection. This question is highly speculative. There is no evidence in the record to assist this witness in coming up with that answer. Any answer that he would give is highly speculative at best.

BY MR. AGATHEN:

Q Let me restate it. Is it Ameren's projection at this point that if you add 4,500 gigawatt hours of renewable wind generation, for example, in the year 2021, would that put Ameren over the one percent rate cap?

MR. ZELLERS: I'm going to object. Again this is the same question that calls for a speculative answer.

THE WITNESS: We determined with our analysis that we would not be able to acquire that much wind energy and stay within the one percent cap.

BY MR. AGATHEN:

Q So hypothetically if you did purchase that amount of wind energy, you would be over the one percent rate cap --

MR. ZELLERS: Again --

MR. AGATHEN: -- is that correct?

MR. ZELLERS: -- I'm going to object that this is calling for speculation.

THE WITNESS: We would be.

BY MR. AGATHEN:

Q Do you know by how many dollars you would

project to be over the one percent rate cap?

MR. ZELLERS: I'm going to object to that as speculation. Calls for a speculative answer.

THE WITNESS: I don't remember.

BY MR. AGATHEN:

Q Do you have any kind of approximation? I mean are we talking a few dollars or millions?

MR. ZELLERS: I'm going to object. That's been asked and answered. The witness has testified that he does not know the answer.

THE WITNESS: It would be millions.

BY MR. AGATHEN:

Q Let's go back to Page 39 of Chapter 5 of Exhibit A, and near the bottom starting four lines up from the bottom it says at the end of the planning horizon Ameren Missouri nonrenewable energy is about 5 percent of the retail load compared to the 15 percent RES requirement. In all eight portfolios the eight percent cap is reached in 2019 which is the first year nonsolar resources are needed. The addition of solar resources before 2019 depletes much of the one percent rate cap funds.

Do you see that section that I just read?

A I do.

Q I have a question first, you say in the first line I read from, at the end of the planning horizon Ameren

Missouri nonrenewable energy is about five percent of the retail load. Is that correctly stated there or should that non be deleted to make that correct?

A It should read renewable energy.

Q So the non is basically a misprint and it should be deleted?

A That's correct.

Q Thank you.

And the last sentence I quoted about the addition of solar resources depleting much of the one percent rate cap, does that mean Ameren has no ability to add significant amounts of nonsolar renewable energy after 2019 and still stay within the cap?

MR. ZELLERS: I'm going to object to that as calling for speculation.

THE WITNESS: Could you repeat that.

BY MR. AGATHEN:

Q Sure. I'm looking at the sentence which says the addition of solar resources before 2019 depletes much of the one percent rate cap funds. Does that mean Ameren has no ability to add significant amounts of nonsolar renewable energy after 2019?

MR. ZELLERS: Again I'm going to object that that calls for speculation.

THE WITNESS: It depends what is meant by

significant.

BY MR. AGATHEN:

Q But it is a factor in limiting the amount of nonsolar renewable energy that Ameren can buy?

MR. ZELLERS: Objection. That's been asked and answered.

THE WITNESS: Adding those solar resources does have an effect on how much can be spent on other resources.

BY MR. AGATHEN:

Q And when it says it depletes much of the one percent rate cap funds, you're saying you don't know how much, is that correct?

A I don't know.

Q If you go to Appendix A to Chapter 5 which follows in Exhibit A, it follows Page 41, do you have that with you?

A I do.

MR. ZELLERS: Paul, could give me a second here.

MR. AGATHEN: Sure.

MR. ZELLERS: I'm trying to find the page we're talking about.

MR. AGATHEN: Chapter 5, Appendix A, Page 2 which follows in Exhibit A Page 41 of Chapter 5.

MR. ZELLERS: Okay. I see what you're referring to.

BY MR. AGATHEN:

Q Could you explain what's meant by the first bullet point there, Ameren Missouri is not currently operating in a capacity constrained environment from either a generation or energy delivery standpoint?

A What that means is that we have plenty of generating capacity to meet needs and that there aren't significant constraints in the energy delivery system, the distribution system, to warrant a large amount of storage.

Q Could you go now to Chapter 6 in Exhibit A, Page 5. If you'll look at the first two full paragraphs there and just briefly read them to yourself. But basically cover most of the Page 5 there, those two paragraphs. My question going to be are these paragraphs basically a high level summary of the process involved in transmission planning for the Ameren system.

MR. ZELLERS: I'm going to object to that question as ambiguous. I myself don't really understand what he's asking.

THE WITNESS: The first paragraph at a high level describes our participation in the MISO transmission expansion planning process. The second paragraph describes what we do in terms of analysis to respond to requests for

generation interconnect.

BY MR. AGATHEN:

Q Okay. Could you try and explain very briefly in laymen's terms if you would what those two paragraphs are describing.

A The first paragraph essentially describes the bottom up and top down transmission planning approach which means that each of the transmission operators within MISO develops transmission plans that it then submits through the MISO transmission expansion planning or MTEP process which then looks at all of the projects proposed by the transmission owners, and for certain ones that are based on economics, evaluates them on a cost benefit measure and then makes a final determination as to which projects will be completed.

Q Does that basically cover both paragraphs?

A That covers Paragraph 1.

Paragraph 2 covers requests from generators to interconnect to the ~~bolt~~ bulk transmission system and the performance of transmission studies to determine what might be required on the transmission system to interconnect those generators.

Q If you go to Chapter 7, Page 1 in Exhibit A, the third bullet point there says Ameren Missouri plans to spend nearly 60 million-dollars over three years on energy

efficiency programs to obtain nearly 253 gigawatt hours of energy savings and over 54 megawatts of peak demand savings, is that correct?

A That's correct.

Q Does this mean that you project a decrease of 253 gigawatt hours of energy sales below what it would be without those demand ~~site~~ side programs?

A That's correct.

Q Is that an annual figure?

A That is an annual figure as of the end of the three years.

Q The end of the three years being when?

A That would be through 2014 I believe.

Q Okay. In general how do your demand ~~site~~ side programs compare with renewables such as wind as far as being cost effective means of meeting energy needs?

A We have found generally that energy efficiency programs are lower cost in terms of cost per kilowatt hour than any other resources.

Q If you go to Chapter 9 now of Exhibit A, Page 10, do you see Table 9.4 there?

A Yes.

Q Does the column on the left -- well, what does the column on the left list?

A The first column lists whether or not our

contract with Noranda, N-O-R-A-N-D-A, continues or expires in 2020.

Q And the next column?

A And the next column lists the selected alternative resource plans that we evaluated with a scorecard.

Q And across the top looking at the very first row, what's listed there? Yeah, the very first row.

A The top heading?

Q Yes.

A It lists the different attributes that we evaluated for each resource plan.

Q And looking at that table a second column from the right is called economic development?

A That's correct.

Q And is that measured in terms of job growth?

A Primary job growth, yes.

Q In terms of FTE's which are what?

A In terms of full-time equivalent, FTE years.

Q Okay. So FTE is full-time equivalent?

A Correct.

Q If you would go back a page near the top of the first full paragraph, does that describe or explain how the FTE's were calculated for the wind option?

A Yes.

Q And that was calculated using a model called JEDI, J-E-D-I, all caps?

A That's correct.

Q And from your copy of Exhibit A can you read what the FTE factor was or figure was for the wind option.

A For the case in which the Noranda contract continues it is .160.

Q How does that compare relatively speaking with the other FTE figures for the other options?

MR. ZELLERS: I'm going to object. That question is ambiguous.

THE WITNESS: It is significantly lower than those same results for the DSM plans and the nuclear ~~plants~~ plans and the coal plan.

MS. JOHNSON: I understand some of the people on the phone are having a hard time hearing you, Matthew. I don't know if you can speak up a little bit.

THE WITNESS: I'll try.

BY MR. AGATHEN:

Q Do you know, are you familiar enough with wind turbines to know whether wind speed at the site of the turbine is a significant factor in determining the capacity factor of that turbine?

MR. ZELLERS: I'm going object to that question. No foundation has been laid for this witness to

testify as to wind generation or wind turbine capacity or anything related to wind generation.

THE WITNESS: Wind speed is one of the factors.

BY MR. AGATHEN:

Q Is it is a major factor?

MR. ZELLERS: Same objection. No foundation has been laid for this.

THE WITNESS: Yes.

BY MR. AGATHEN:

Q If you go to Chapter 10, Page 18 on Exhibit A, does the first full paragraph say that demand ~~site~~ side programs are the cheapest of the alternatives you looked at in terms of the lowest present value of the revenue requirement?

A That's correct.

Q And for what period of time does that hold true?

A When we look at it we're looking at it for a period of 20 years.

Q And near the bottom of Page 18 under the heading of renewables, the first sentence there says as outlined in Chapter 5 Ameren Missouri expects to be in compliance with the nonsolar portion of Missouri's renewable energy standard, RES, throughout the implementation period without the addition of new renewable

resources, do you see that?

A I see that.

Q And what period of time are you talking about there for the implementation period?

A The implementation period here was through 2014.

Q I have a few questions now about Exhibit B. Do you have a copy of that?

A Yes, I do.

Q And Exhibit B consists of, as we indicated, certain pages from the 2013 integrated resource plan update which was filed by Ameren with the Missouri Commission.

A That appears to be the case, yes.

Mr. Zellers
~~THE WITNESS~~: I'm going to renew my objection. This document has not been sufficiently authenticated.

BY MR. AGATHEN:

Q Has any updated or new plan been filed yet for 2014?

A No.

Q So Exhibit B would be the latest update, or portions of the latest update which were filed?

A That's correct.

Q Pages 1 and 2 of the executive summary of Exhibit 2 talk about potential changes in laws and regulations dealing with coal plants and then you discuss

various ways of dealing with that, do you not?

A Yes.

Q Is one possibility the retirement of the Meramec plant?

A That is one possibility.

Q And if you do retire the Meramec plant, do you know what the preferred option would be to replace that energy?

MR. ZELLERS: I'm going to object. That question is ambiguous. Calls for facts not in evidence and calls for speculation.

THE WITNESS: It's hard to say that there would be a particular preferred replacement option since we looked at the system as a whole.

BY MR. AGATHEN:

Q So that would involve looking at different options as you got closer to that point of retiring the plant?

A And in the context of the entire load need and resources available.

Q If you go to Page 3 of the executive summary, again we're on Exhibit B, do you see Figure 1.1 there?

A Yes.

Q Levelized costs of energy?

A Correct.

Q Are those costs Ameren's projections for new sources of generation as opposed to existing plants?

A Those are for new sources, yes.

Q Do these costs include components for transmission?

A Only to the extent needed for the local interconnection.

Q So again it would assume that the source of the generation is in close proximity to your existing transmission facilities?

MR. ZELLERS: Objection. He's mischaracterizing the testimony. That's also ambiguous.

THE WITNESS: It would include whatever we expected to need in order to interconnect the generation. Some of these are generic, some are site specific which would include site specific estimations of the transmission required.

BY MR. AGATHEN:

Q Let's look at wind. Do you see that, the second item?

A Yes.

Q Would that include the cost of transmission of bringing wind from western Kansas to the Ameren transmission system?

A It would not.

Q What might it include, do you know?

A It would include the short run interconnect to the ~~bolt~~ bulk transmission system, as I said before, roughly six miles.

Q Thank you.

MR. LINTON: When you say a line to interconnect are you referring to what is typically called a generator lead line?

THE WITNESS: Essentially, yes.

BY MR. AGATHEN:

Q Page 4 of the executive summary of Exhibit B, Paragraph 1, I'm looking at, I guess, the fourth line. The report says that the levelized cost for wind does not account for the variable nature of wind generation or the full cost of transmission needed to integrate it to the grid, do you see that?

A I don't. Which page are you on?

Q Page 4 of the executive summary in Exhibit B. I'm starting at about the fourth line.

A And which passage?

Q In looking at the first full paragraph there, it's actually the top of the page, the paragraph that begins at the top of the page starting at Line 4 where you say it is important to note that levelized costs of energy figures while useful for convenient comparisons of resource

alternatives do not fully capture all the relative strengths and challenges of each resource type.

For example, wind ~~resorts~~ resources are ~~intermediate~~ intermittent resources and therefore cannot be counted on for meeting peak demand requirements in the same way as a nuclear or gas fired resource can.

The levelized cost of wind resources presented in Figure 1.1 also does not reflect the full cost of transmission infrastructure needed to integrate wind and other intermittent resources into the electric grid. Is that correct?

A That's correct.

Q If Ameren were to purchase wind energy from say Kansas or Iowa, do you know who would bear the additional costs that are being discussed there for the wind generation?

MR. ZELLERS: Objection. This is highly speculative. It depends on a number of factors that we have no idea if this witness is aware of.

THE WITNESS: Could you repeat the question.

BY MR. AGATHEN:

Q Sure. If Ameren were to purchase wind energy from say Kansas or Iowa, do you know who would bear the additional costs that were discussed in that paragraph we just read from?

MR. ZELLERS: I renew that objection. Calls for speculation.

THE WITNESS: Ultimately any cost for delivery of energy to our customers would be ~~bourne~~ borne by our customers.

BY MR. AGATHEN:

Q Thank you.

If you go to Page 9 of the technical overview, again on Exhibit B, if you could read over those last two paragraphs there on that page, my question is going to be whether or not you've completed the analysis that you're discussing here. And going on to Page 10 as well.

A Okay.

Q Have you completed the analysis you're talking about there?

A Yes.

Q And when will that be reported?

A With the filing of our 2014 IRP in October of this year.

Q Do you know whether your current resource planning still envisions a gas fired combined cycle plant to come on line in the year 2029 or so?

A Our current preferred resource plan on file with the Missouri Public Commission does not include that resource.

Q Do you know what has been added or if anything in lieu of that?

A Our current preferred plan includes higher amount of energy efficiency programs than what was included in our 2011 IRP.

Q Do you know what renewable energy certificates, what that term refers to?

A I do.

Q What do you guys call them?

A REC's.

Q REC's, R-E-C's. You're generally familiar with how those factor into Ameren's integrated resource plan and its renewable standard plans?

A Yes.

Q This may or may not be confidential, and if it is, someone let me know, but do you know what the projected Ameren costs are for REC's over the next several years?

A I don't.

Q Going back to your FERC Form 1, Exhibit C, first page which includes plant specific data has a plant called Maryland Heights LF, do you see that?

A Which page?

Q It's the first full page with plant data, plant specific data on it, in one of the top columns.

A I see it.

Q Okay. What plant is being referred to there as the Maryland Heights LF plant?

MR. ZELLERS: I'm going to object. This witness has already testified a couple of times that he's not familiar with this document. He's unable to testify confidentially as to its contents.

THE WITNESS: Our Maryland Heights landfill gas facility is a set of three combustion turbine units at a landfill in Saint Louis County.

BY MR. AGATHEN:

Q Do you know if Ameren has filed that as part of its renewable energy standard plan?

A Yes, we have.

Q And has it been accepted as qualifying under that plan?

A Yes, it has.

MR. ZELLERS: I heard a strange noise on the phone. Does it sound like we've dropped a call?

MR. BYRNE: It's the noise when people hang up.

MR. ZELLERS: Okay.

BY MR. AGATHEN:

Q Do you have a copy of Exhibit D before you?

A Yes.

Q And the last three pages of that include portions of the stipulation and agreement which was filed in the designated case?

A That appears to be the case.

MR. ZELLERS: I'm going to object to that question again. Improper foundation has been laid. We don't know that this witness prepared this document or has any other familiarity with it.

BY MR. AGATHEN:

Q Are you familiar with the document?

A I am.

Q Looking at the bottom of Page 9, I'm starting to read from the fourth line up from the bottom, it says Ameren Missouri agrees to cooperate in implementing a rule establishing priority for reduction or elimination of REC's and SREC's unassociated with electricity delivered to Missouri customers when the utility has reached the one percent retail rate limit and must adjust downward their renewable energy resources pursuant to, and it gives a certain commission rule there.

And then goes on to say, in place of such REC's or SREC's establishes a preference for utility owned renewable energy resources, do you see that?

A I do.

Q Do you know what Ameren considers to be the

utility owned renewable energy resources that are referred to there?

A It would, in this context this refers to new utility owned renewable energy resources.

Q The utility being Ameren?

A Correct.

MR. ZELLERS: I'm going to object, renew my objection. Improper foundation has been laid for this line of questioning regarding Exhibit D.

MR. AGATHEN: That's all I have. Thank you very much.

THE WITNESS: You're welcome.

MR. BYRNE: Does anyone else have questions?

MR. ZELLERS: Not at this time but I'd like to take a break and keep it open until after the break.

MS. HAMPTON: Staff will have questions but we would also like a break to discuss.

MR. AGATHEN: We're going to take a break on this end. We'll be right back.

(Thereupon, a recess was taken, after which the following proceedings were had:)

MR. AGATHEN: This is Paul Agathen. I'm finished with my questions. The court reporter has a request for everybody.

(Thereupon, a discussion was held off the

record, after which the following proceedings were had:)

MR. ZELLERS: I've learned from some of the parties on the phone that they're having a difficult time hearing our primary players questions and answers. So if everyone could speak up just a little bit and try to help us out through the last few minutes of this.

THE WITNESS: Okay.

MR. AGATHEN: Who wants to go first?

MS. HAMPTON: This is Whitney from Staff. I don't mind --

MR. AGATHEN: Go ahead.

MS. HAMPTON: -- going first. I might be the only one.

CROSS-EXAMINATION

BY MS. HAMPTON:

Q Okay. Just to clarify first, Mr. Michaels, the questions that Mr. Agathen asked were regarding the 2011 IRP and our questions will be similar, at least some of them, but it's for a more recent timeframe.

A Okay.

Q So to begin with, are you familiar with MISO project number 8 -- or H086 which was intended to connect 300 megawatts of wind generation just north of Spencer Creek substation in Ralls County, Missouri?

A I am not familiar with that project.

Q Is the Palmyra Tap 345 kilovolt substation synonomous with the Maywood 345 kilovolt substation?

A I don't know.

MS. HAMPTON: For the reporter it's P-A-L-M-Y-R-A.

THE WITNESS: I don't know.

BY MS. HAMPTON:

Q Will a new substation be -- or excuse me, let me back up. Does the Maywood 345 kilovolt substation currently exist?

A I don't know. This is not my area of expertise.

Q Okay. Are you familiar with the Ottumwa, Iowa to Quincy, Illinois multi-value project?

A No, I'm not.

Q All right. So I'm getting to those questions that were more towards Mr. Agathen now. Has Ameren Missouri performed any production costs modeling or fuel runs based on the construction of the Maywood converter station delivering 500 megawatts of wind starting in 2018?

A I don't know. I'm not familiar with any such runs.

Q Although you're not familiar with them -- or you don't know if a study has been done rather, do you have an opinion on the impact of the proposed converter on

Missouri wholesale energy average energy costs?

A No, I don't.

Q Just one moment.

Will Ameren Missouri, will their October 2014 electronic resource planning filing reflect the converter station, the IRP will not reflect the converter station?

A Our IRP will include a reference to MISO's most recent MTEP documents. So if those are included in the MTEP documents, they'll be included by reference.

Q Would you expect Ameren Missouri's average net energy costs to be increased or decreased by use of the Maywood converter station to inject 500 megawatts of energy?

A I'm not familiar with any studies and have no basis to form an opinion.

Q Hold on just a moment, please.

Do you have safety concerns about Grain Belt Clean Line project regarding Ameren Missouri's system?

A I am not aware of any safety concerns.

Q Does Ameren Missouri currently have personnel qualified to service the Grain Belt Clean Line operations and to handle the maintenance or restoration of service equipment?

A I don't know.

Q Would there likely be a mutually aid agreement between Ameren Missouri and Grain Belt Clean Line?

A I don't know.

Q Okay. Would Ameren Missouri's equipment be able to serve the Grain Belt line and the Maywood converter station?

A I don't know.

Q And lastly, can you provide a general update on the status of the MISO multi-value projects in zones five and six?

A Yeah, I don't have intimate knowledge, so, no.

MS. HAMPTON: That's it for us.

MR. AGATHEN: Hearing nothing I will assume no more questions from the phone.

BY MR. JARRETT:

Q This is Terry Jarrett. I had just a couple of questions. Do you remember staff counsel asking you questions about the Palmyra converter station?

A Yes.

Q And I recall your answers to all those questions were that you didn't know?

A That's correct.

Q Who at Ameren would know the answers to those questions?

A I would expect it would be in our transmission

planning function.

Q And do you have any specific name or names of people who might be able to answer those questions?

A Dennis Kramer is probably the best source for that.

Q Thank you. Do you remember staff counsel asking you some questions about maintenance and service of the lines, if Ameren was qualified or could do that, do you remember that line of questioning?

A Yes.

Q And as I recall your answer was you didn't know the answers to those questions?

A That's correct.

Q Who at Ameren would know the answers to those questions?

A I'm not entirely sure. It would be somebody in our energy delivery organization.

Q Okay. And do you have any specific names of people that might be able to answer those questions?

A I'm sorry, I don't.

Q And then finally staff counsel asked you about the MTEP.

A Yes.

Q And I believe your answers to those questions were you didn't know or that you weren't familiar?

A I don't have intimate familiarity with the projects included in the MTEP.

Q Who at Ameren would be able to answer those questions?

A I would also start with Dennis Kramer for that. That's D-E-N-N-I-S, K-R-A-M-E-R.

MR. JARRETT: Okay. Thank you, sir. I don't have any further questions.

MR. AGATHEN: Anybody else on the phone lines?

MR. ROBERTSON: Henry Robertson. I'll gladly defer to Clean Line if they have any questions.

MR. ZELLERS: We do if no one else has anything.

CROSS-EXAMINATION

BY MR. ZELLERS:

Q Mr. ~~Michaels~~ Michels, just real briefly, let's talk about Exhibit A which you were handed. Can you tell me the date in which this was published?

A This was filed February 23rd, 2011.

Q Did this take into account a possible 500 megawatt energy injection from the Grain Belt Express project?

A Not to my knowledge.

Q Did this take into account recent changes under Section 111D to the Clean Air Act?

A It did not.

Q Let's take a look at Exhibit B. Can you tell me on what date this was published?

A I don't haven't an exact date but it was in March of 2013.

Q March of 2013?

A Correct.

Q Did this document or any of the studies comprising this document take into account a possible 500-megawatt injection of wind power from the Grain Belt Express Clean Line project?

A It did not.

Q Did this take into account recent changes to Section 111D of the Clean Air Act?

A No.

Q Let's move on to Exhibit E. The date of publication is on the front page of this document, but can you tell us, can you verify that and tell us what date it was published.

A Yes, April 15th, 2014.

Q Did this document or any of the studies comprising this document take into account a possible injection of 500 megawatts of wind power from the Grain Belt Express Clean Line project?

A No.

Q Did this take into account recent changes to Section 111D of the Clean Air Act?

A No.

MR. ZELLERS: Okay. That's all I have.

THE COURT REPORTER: Signature.

MR. BYRNE: I guess we'd like to sign it.

THE COURT REPORTER: Do you take a copy?

MR. ZELLERS: Please, standard and E-mail if you can do that.

THE COURT REPORTER: Anybody on the phone, do you need a copy?

MR. AGATHEN: Do you want a copy of the transcript?

MS. HAMPTON: Staff would like a copy of the transcript.

THE COURT REPORTER: What format?

MS. HAMPTON: Paper and electronic.

MS. PEREZ: Union would like a copy.

THE COURT REPORTER: What format?

MS. PEREZ: E-mail is fine.

MR. JARRETT: This Terry Jarrett. I would like a copy.

THE COURT REPORTER: What format, please?

MR. JARRETT: Electronic is fine, by E-mail.

MR. AGATHEN: Are there any more from anybody

for the witness who's on the phone line?

MR. ROBERTSON: This is Henry Robertson with the Sierra Club. I would like to ask a few.

CROSS-EXAMINATION

BY MR. ROBERTSON:

Q Mr. ~~Michaels~~ Michels, you are preparing to make a tri-~~annular~~ annual IRP filing in the fourth quarter of this year, is that right?

A That's correct.

Q Can you be more exact about the timeline?

A October 1st, 2014.

Q And you're aware that Clean Line is proposing to deliver 500 megawatts of wind energy to the Ameren system, are you?

A I am generally aware.

Q All right. Have you screened supply ~~site~~ side resource options to see which ones will be included in alternative resource plans?

A Yes.

Q Was the Clean Line proposal included as a supply site option?

A No.

Q Did you only consider wind as a generic resource?

A Yes.

MR. ROBERTSON: That's all I have.

MR. AGATHEN: Anybody else on the phone lines? Going once, going twice. I think we're through.

(Thereupon, the deposition was concluded at 11:25 a.m.)

CERTIFICATE OF REPORTER

I, Jo Ann Dickson, Certified Shorthand Reporter, Notary Public within and for the State of Missouri, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; the testimony of said witness was taken by me to the best of my ability and thereafter reduced to typewriting under my direction; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

_____

Jo Ann Dickson, CCR, 1085

I, MICHAEL MATTHEWS, do hereby certify:

That I have read the foregoing deposition;

That I have made such changes in form and/or substance to the within deposition as might be necessary to render the same true and correct;

That having made such changes thereon, I hereby subscribe my name to the deposition.

I declare under penalty of perjury that the foregoing is true and correct.

Executed the _____ day of _____, 20___, at _____.

_____.

MICHAEL MATTHEWS

My Commission Expires: _____

Notary Public: _____

MATTHEW MICHELS

I, ~~MICHAEL MATTHEWS~~, do hereby certify:

That I have read the foregoing deposition;

That I have made such changes in form and/or substance to the within deposition as might be necessary to render the same true and correct;

That having made such changes thereon, I hereby subscribe my name to the deposition.

I declare under penalty of perjury that the foregoing is true and correct.

Executed the 22ND day of AUGUST, 2014, at _____.

_____.

~~MICHAEL MATTHEWS~~
MATTHEW MICHELS

My Commission Expires: 7/19/2017

Notary Public: Patricia L Fortney

Patricia L. Fortney - Notary Public
Notary Seal, State of
Missouri - St. Louis City
Commission #13402451
My Commission Expires 7/19/2017

Errata Sheet

Witness: Matthew Michaels

In Re: In The Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity.

Upon reading the deposition and before subscribing thereto, the deponent indicated the following changes should be made:

Page Aw Line HEADER Should read: MATTHEW MICHELS 7/10/2014
Reason assigned for change : LAST NAME MISSPELLED

Page 1 Line 12 Should read: DEPOSITION OF MATTHEW MICHELS
Reason assigned for change : LAST NAME MISSPELLED

Page 3 Line 11 Should read: DEPOSITION OF WITNESS, MATTHEW MICHELS
Reason assigned for change : NAME MISSTATED

Page 6 Line 2 Should read: ... deposition of MATTHEW MICHELS.
Reason assigned for change : NAME MUTTATED

Page 6 Line 10 Should read: MATTHEW MICHELS
Reason assigned for change : NAME MUTTATED

Page 8 Line 4 Should read: ... Matthew Michels
Reason assigned for change : LAST NAME MISSPELLED

Page 10 Line 6 Should read: This does appear to be our 2011 IRP
Reason assigned for change : MISSING WORDS

Page 21 Line 19 Should read: ... peak demand requirements
Reason assigned for change : TYPO

Page 22 Line 5 Should read: ... then MISO ...
Reason assigned for change : TYPO

Page 26 Line 22 Should read: the bulk transmission system.
Reason assigned for change : TYPO

Page 28 Line 6 Should read: .. the bulk transmission system,
Reason assigned for change : TYPO

Reporter: Jo Ann Dickson, RPR, CCR

Errata Sheet

Witness: Matthew Michaels

In Re: In The Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity.

Upon reading the deposition and before subscribing thereto, the deponent indicated the following changes should be made:

Page 40 Line 19 Should read: ... the bulk transmission system...
Reason assigned for change : TYPO

Page 41 Line 7 Should read: ... demand side programs?
Reason assigned for change : TYPO

Page 41 Line 14 Should read: ... demand side
Reason assigned for change : TYPO

Page 43 Line 13 Should read: ... nuclear plans
Reason assigned for change : TYPO

Page 44 Line 12 Should read: ... demand side programs
Reason assigned for change : TYPO

Page 45 Line 14 Should read: MR. ZELLERS: ...
Reason assigned for change : PERSON MISIDENTIFIED

Page 48 Line 3 Should read: the bulk transmission system...
Reason assigned for change : TYPO

Page 49 Line 3 Should read: wind resources...
Reason assigned for change : TYPO

Page 49 Line 3 Should read: ... are intermittent
Reason assigned for change : TYPO

Page 50 Line 4 Should read: ...would be borne...
Reason assigned for change : TYPO

Page 60 Line 16 Should read: Mr. Michels, ...
Reason assigned for change : NAME MISSPELLED

Reporter: Jo Ann Dickson, RPR, CCR

Errata Sheet

Witness: Matthew Michaels

In Re: In The Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity.

Upon reading the deposition and before subscribing thereto, the deponent indicated the following changes should be made:

Page 63 Line 6 Should read: Mr. Michels, ...
Reason assigned for change : NAME MISSPELLED

Page 63 Line 7 Should read: tri-annual IRP...
Reason assigned for change : TYPO

Page 63 Line 16 Should read: ... supply side
Reason assigned for change : TYPO

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Reporter: Jo Ann Dickson, RPR, CCR

Errata Sheet

Witness: Matthew Michaels

In Re: In The Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity.

Upon reading the deposition and before subscribing thereto, the deponent indicated the following changes should be made:

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Page Line Should read:
Reason assigned for change :

Reporter: Jo Ann Dickson, RPR, CCR

Midwest Litigation Services

July 22, 2014

Thomas M. Byrne
General Counsel Ameren
1901 Chouteau Avenue
St. Louis, Missouri 63103

Dear Mr. Byrne:

Please find enclosed your copy of the Deposition of Matthew Michaels, taken on July 10, 2104 in the above-referenced case. Also enclosed is the original signature page and errata sheets.

Please have the witness read your copy of the transcript, indicate any changes and/or corrections desired on the errata sheets, and sign the signature page before a notary public.

Please return the errata sheets and notarized signature page to Paul A. Agathen for filing prior to trial date.

Thank you for your attention to this matter.

Sincerely,

Jo Ann Dickson

Integrated Resource Plan

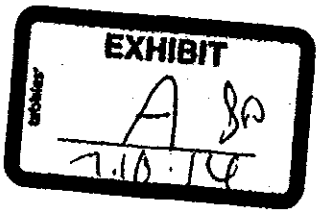


Table of Contents

5. Renewable and Storage Resources

Highlights

- *Today 4% of Ameren Missouri's energy is produced by renewable resources, mostly from hydroelectric plants.*
- *With the help of Black and Veatch, Ameren Missouri has identified several promising renewable projects within its service territory.*
- *Although the region is flush with biomass materials, the use for power plant operations is highly dependent on the emergence of a sustainable fuel supply.*
- *Ameren Missouri has not only developed a long-term plan to meet the state's Renewable Energy Standard but has also evaluated the need to meet potential Federal renewable requirements.*
- *Although existing renewable resources meet non-solar requirements, Ameren Missouri will be procuring solar energy credits throughout the implementation period.*

Ameren Missouri has analyzed various renewable and energy storage options in the region. Most of the energy storage options are relatively small and expensive; however, pumped storage and compressed air storage were evaluated in detail as the most promising energy storage options. In 2009, Ameren Missouri worked with Black and Veatch to identify potential renewable projects in the region including landfill gas, hydroelectric, biomass, and anaerobic digestion. Black and Veatch also helped Ameren review the various solar technologies to determine which ones would be most appropriate for the region. All the information collected supported the analysis to determine which projects were the most promising and need to be considered further. Most of the evaluated renewable projects were small and opportunistic in nature. Wind and biomass co-firing showed the highest potential of renewable resources. Both have limitations – transmission issues for wind and fuel supply for co-firing.

In November of 2008, Missouri voters approved Proposition C, also known as the Clean Energy Initiative or the Missouri Renewable Energy Standard. Unfortunately, Proposition C contained two conflicting goals. On one hand, it set a goal of acquiring renewable energy equal to 15% of our electricity sales by 2021 with 2% of that amount coming from solar. On the other hand, it limited rate increases supporting new renewables to 1% or less. Based on current costs for renewable energy, both goals cannot be met at the same time.

Ameren Missouri modeled renewable portfolios for both the state RES and a potential Federal RES. One distinguishing difference between the two was that the Federal RES

Exh. A

Inverters, unlike solar modules, have significant economies of scale. Commercial and residential systems use the same types and sizes of modules, but commercial systems use much larger inverters. Commercial scale inverters will typically cost between 20 and 30 cents per watt, while residential systems can cost as much as 70 cents per watt. Black & Veatch does not foresee major cost reductions in commercial inverters in the coming years.

Mounting Systems

Utility scale PV installations are ground mounted with a fixed orientation often at latitude tilt or on one or two axis trackers. Flat plate PV panels receive the most insolation, and therefore produce the most power, when directly facing the sun. If panels are fixed in their mounting, the most production over a year is obtained by facing the panels south and tilting them at the site's latitude.

Many system designers, however, wish to maximize production in summer months when power prices are higher. For maximum summer production, latitude minus 15 degrees (or roughly 20 degrees in North America) is optimal. This tilt will produce 6 percent more than latitude tilt in the summer months (May through September) and about 2 percent less over a full year. Laying panels flat will produce roughly the same as this in the summer months, but about 11 percent less annually.

There are also single axis and two axis tracking systems. As the name suggests, single axis tracking systems will follow the sun in one direction (i.e. east to west) to increase insolation. One axis tracking flat plate PV systems produce roughly 20 percent more energy than latitude tilt fixed panels and 35 percent more in summer months.

Two axis tracking systems will adjust both east to west and north to south so that the panels are always directly facing the sun. Two axis flat plate PV systems produce approximately 30 percent more than fixed panels and 40 percent more in summer months. This performance comes at a cost, however, as these systems use more land area and are much more costly to install and maintain. These trackers are commonly used in off-grid locations where maximum power is required throughout the year.

Solar PV systems cost $6,000/kW with a capacity factor of approximately 21% in the Ameren Missouri region[17]. It is noteworthy that solar capital costs are expected to decline in real dollars; therefore, solar capital costs were escalated at 1% while inflation is expected to be 3%. Chapter 5 – Appendix B contains more detailed information.

5.3.6 Potential Wind Resources

For resource planning purposes Ameren Missouri characterized a generic wind resource in the Midwest (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma,

[17] 4 CSR 240-22.040(1)(E); 4 CSR 240-22.040(1)(J)

Ex 6. A

allowed no-carbon resources to reduce the base from which the energy requirement is calculated. Another difference was the 4% Federal RES rate cap, which did not constrain compliance, unlike the 1% cap in the Missouri RES. In both portfolios wind was a major contributor to compliance, while the Federal RES also included substantial biomass co-firing. In fact, the amount of co-firing included exceeded the estimated fuel supply. Without a sustainable fuel supply, co-firing would be supplanted with additional wind resources.

The renewable portfolios were included in the alternative resource plans as described in Chapter 9. It is noteworthy that wind was also included as a major supply-side resource in the development of alternative resource plans to compete with pumped hydro and the thermal resources identified in Chapter 4. One major weakness of wind is its limited availability during summer peak hours. To compensate for this weakness Ameren Missouri paired wind with peaking resources. Simple cycle combustion turbines are a great compliment for wind as they are primarily functioning during peak conditions.

5.1 Existing Renewable and Storage Resources

Currently Ameren owns and operates 382 MW of hydroelectric resources and 440 MW of pumped storage with an additional purchase power agreement for 102 MW of wind. In December, 2010 Ameren Missouri completed the installation of approximately 100 kW of solar panels using monocrystalline, polycrystalline and thin-film technologies. Construction of 15 MWs of landfill gas generation at the Fred Weber site will begin in early 2011.

Keokuk

Ameren Missouri's Keokuk hydroelectric plant is located on the Mississippi River at Keokuk, Iowa, 180 miles north of St. Louis.

More than a million cubic yards of earth and rock were excavated to build the Keokuk dam and plant, which began operation in 1913. The history of the site as a power source began as far back as 1836, when Robert E. Lee conducted a survey for the War Department and called attention to the power potential of this section of the Mississippi. An engineering marvel of its time, Keokuk is the largest privately owned and operated dam and hydroelectric generating plant on the Mississippi River. Over the years, Ameren Missouri has continued to invest millions of dollars for the modernization and repair of the plant and dam.

Ameren Missouri also owns some 12,000 acres of flowage land and land covered by water. The company controls or has flowage rights on a total of 55,000 acres of land

Exh. A

Minnesota, Iowa, Missouri, Wisconsin, Illinois, and Indiana). A capacity factor of 37.5% was estimated using the latest wind potential estimates from the National Renewable Energy Laboratory (NREL) for the Midwest at an 80 meter hub height[18]. The generic wind overnight project cost is expected to be $2,000/kW, including owner's cost. For modeling purposes no additional transmission costs were included[19]. Chapter 6 includes a description of the transmission build-out assumption that would eliminate any transmission obstacles for new wind resources. The levelized cost of wind is estimated to be 10.81 cents/kWh. Chapter 5 – Appendix B contains more detailed information.

Figure 5.7 Wind Map of U.S.

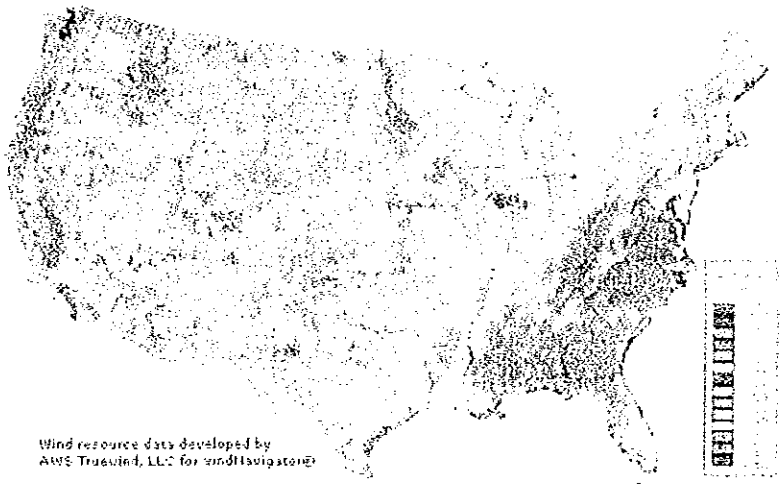
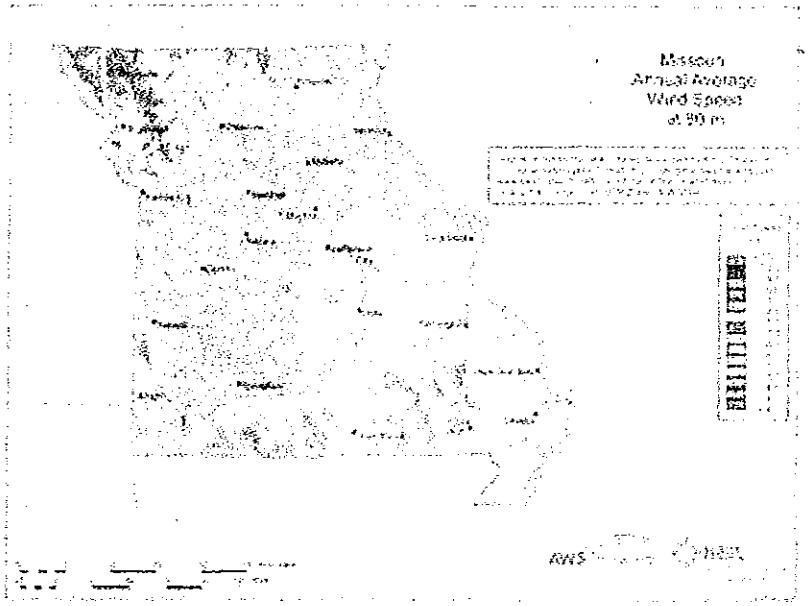


Figure 5.8 Wind Map of Missouri



[18] EO-2007-0409 – Stipulation and Agreement #14
[19] 4 CSR 240-22.040(1)(E); 4 CSR 240-22.040(1)(J)

Exh. A

Wind is not generated uniformly throughout the day, month, or year. The spring and fall months tend to be high production periods, while the summer months generally produce the least amount of energy. The daily generating cycle in the summer months is generally higher during the early morning through 8 a.m., and then from roughly 8 p.m. through midnight. The daily generation cycle tends to be more uniform the rest of the year. Wind is considered to be an energy resource with limited regulatory capacity value – currently 8 percent of the nameplate rating is allowed by MISO.

With a levelized cost of energy of 10.81 cents/kWh, wind is competitive with other thermal resources identified in Chapter 4. However, as described in Chapter 9, alternative resource plans are constructed to meet capacity needs throughout the planning horizon. It would be impractical to use wind as a capacity resource since only 8 percent of the nameplate rating would count. For example, to meet a 300 MW capacity shortfall Ameren Missouri would need 3,750 MW of wind. To incorporate wind as a major supply-side option for alternative resource plans, Ameren Missouri paired wind resources with simple cycle combustion turbines. These two resources are complementary since wind offers energy output while the combustion turbines offer peaking capacity. The combination of 800 MW of wind and 346 MW of combustion turbines provides 410 MW of peaking capacity, which is roughly consistent with the size of other thermal resources being considered. The levelized cost of energy for the combined resource is 12.44 cents/kwh, which is still competitive with the other resources.

The current most prevalent hub height installations in the U.S. are at 80 meters but there is growing interest in 100 meter installations.[20] Currently there are plans for 100 meter installations in Ohio along with potential for others throughout the U.S. After consulting with the renewable team at Ameren the general consensus is that capacity factors would increase from 10-20% moving from 80 to 100 meters in hub height. This increase in hub height is estimated to increase overall installation costs approximately 5%. Given this set of expectations, a 100 meter hub height installation would cause the LCOE to move from as low as 9.47 to as high as 10.26. Given that our base wind assumption for LCOE is 10.81, this range of potential costs indicates that any potential project should incorporate a complete site-specific evaluation of different tower heights to determine which will provide the greatest value.

There are several complicating factors when moving from 80 meters to 100 meters that make the decision to move to the higher installations more than just strictly an economic analysis decision. There are potentially greater hurdles to overcome with regards to permitting the larger towers that include local opposition due to visual appeal, FAA limitations at the higher hub heights, and even issues regarding potential bird and bat

[20] EO-2007-0409 – Stipulation and Agreement #14

Exh. A

migratory path limitations. Additionally, the equipment to install the larger towers is limited and can potentially affect the timing and/or cost of any installation.

Ameren Missouri used 3 TIER's software package called FirstLook to evaluate wind potential in the Ameren service territory. The anticipated capacity factor at the sites was considerably lower than non-Ameren sites thus eliminating them from further consideration.

5.4 Renewable Supply

Black & Veatch developed a supply curve for the aggregate mix of renewable energy projects considered in the Ameren Missouri service territory. Supply curves are used in economic analyses to determine the quantity of a product that is available for a particular price (e.g., the amount of renewable energy that can be generated within a utility system for under $150/MWh).

The supply curve in Figure 5.7 was constructed by plotting the amount of generation added by each project against its corresponding levelized cost. For this study, the renewable generation added by each project class is plotted against its levelized cost of electricity in ascending order. In this case, generation (GWh/yr) is on the x-axis and levelized cost ($/MWh) is shown on the y-axis. Every "step" on the graph represents an individual project color-coded by its technology type. The curve compares the quantities and costs for the renewable resources and shows which products can be brought to market at the lowest cost (resources toward the left side).

Figure 5.9 indicates that there is approximately 1,100 GWh of renewable energy potential. However many of those projects are costly, namely the projects over $200/MWh. Excluding the higher cost projects would leave approximately 540 GWh of renewable energy potential. For comparison, Ameren Missouri expects to need over 500 GWh of new renewable energy in 2019 and almost 4,500 GWh in 2021 to meet the renewable energy requirements of the Missouri RES.

Exh. A

energy requirements. Therefore, there were 16 unique renewable portfolios developed, which are combinations of renewables requirements (2, federal or state), DSM portfolios (4; None, Low Risk, RAP, or MAP), and Noranda's status (2, expires or continues).

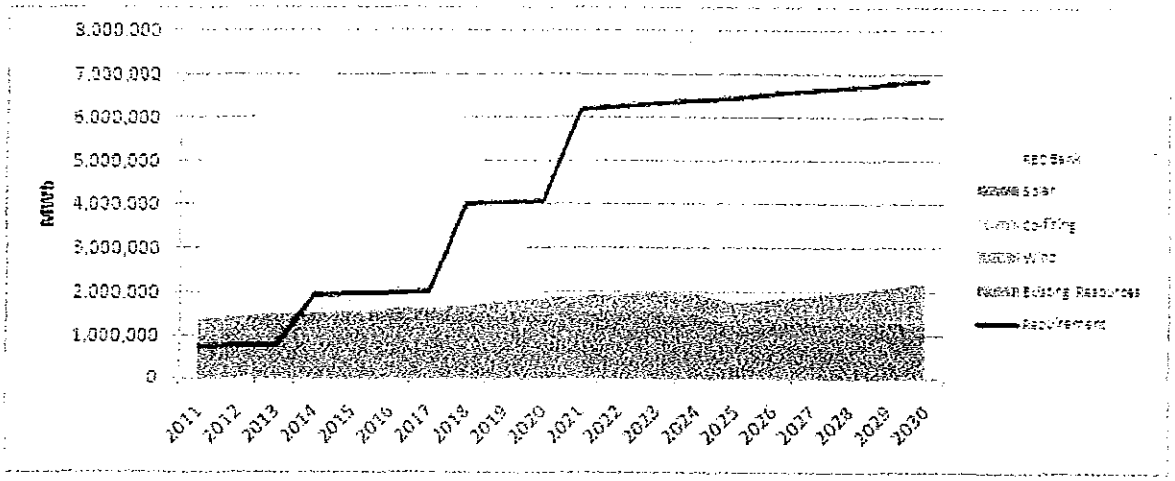
5.5.1 Missouri RES

Ameren Missouri modeled the requirements of the Missouri RES using the previously mentioned spreadsheet model. The implementation rules for the Missouri RES were under development during this analysis, so Ameren Missouri attempted to model a reasonable representation of the RES based on its assessment of the draft rules. The Missouri RES includes a 1% rate impact cap. Eligible renewable resources are defined by the Missouri Department of Natural Resources and include hydro units less than 10MW, landfill gas, biomass co-firing, wind, and solar among others. The Missouri RES also includes a requirement that 2% of the RES requirements are met by solar resources.

Missouri RES Results

Figure 5.11 shows Ameren Missouri's renewable position compared to the RES requirements. Although there were 8 different Missouri renewable portfolios, Figure 5.11 represents the Missouri RES compliant portfolio that includes the Low Risk DSM portfolio and Noranda continuing as a retail customer. It is evident that the 1% rate cap significantly limits the amount of new renewables. Figure 5.11 also shows Ameren Missouri's existing non-solar renewable resources exceed the RES requirements initially and build a renewable credit bank that delays the need for additional non-solar renewable resources. At the end of the planning horizon Ameren Missouri's non-renewable energy is about 5% of the retail load compared to the 15% RES requirement. In all 8 portfolios the 1% rate cap is reached in 2019, which is the first year non-solar resources are needed. The addition of solar resource before 2019 depletes much of the 1% rate cap funds. Table 5.11 and Table 5.12 show the data in tabular format.

Figure 5.11 Ameren Missouri Renewable Resource Position



Exh. A

Although there are 8 unique Missouri RES portfolios, the results for each portfolio are similar as each is constrained by the rate cap. Figure 5.12 shows the amount of solar resources that were added while Figure 5.13 shows the amount of wind resources that were added. More solar resources are added with less energy efficiency since retail sales are greater. Those additional solar resources cost more and therefore cause Ameren Missouri to reach the 1% rate cap faster, reducing the amount of wind that can be added later in the planning horizon.

Figure 5.12 Solar Resources Added for Missouri RES

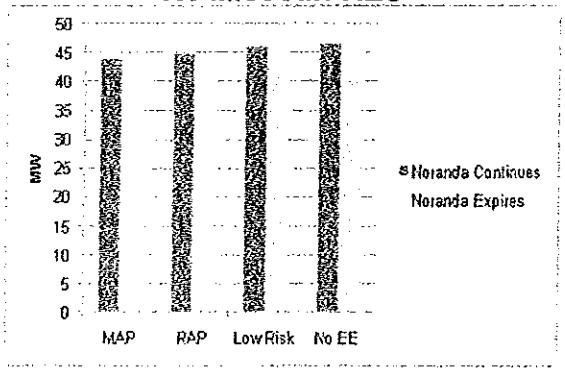


Figure 5.13 Wind Resources Added for Missouri RES

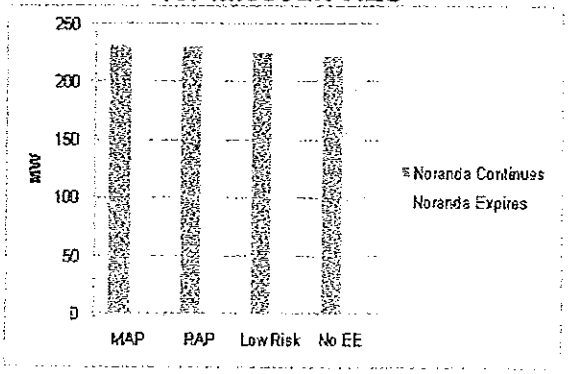
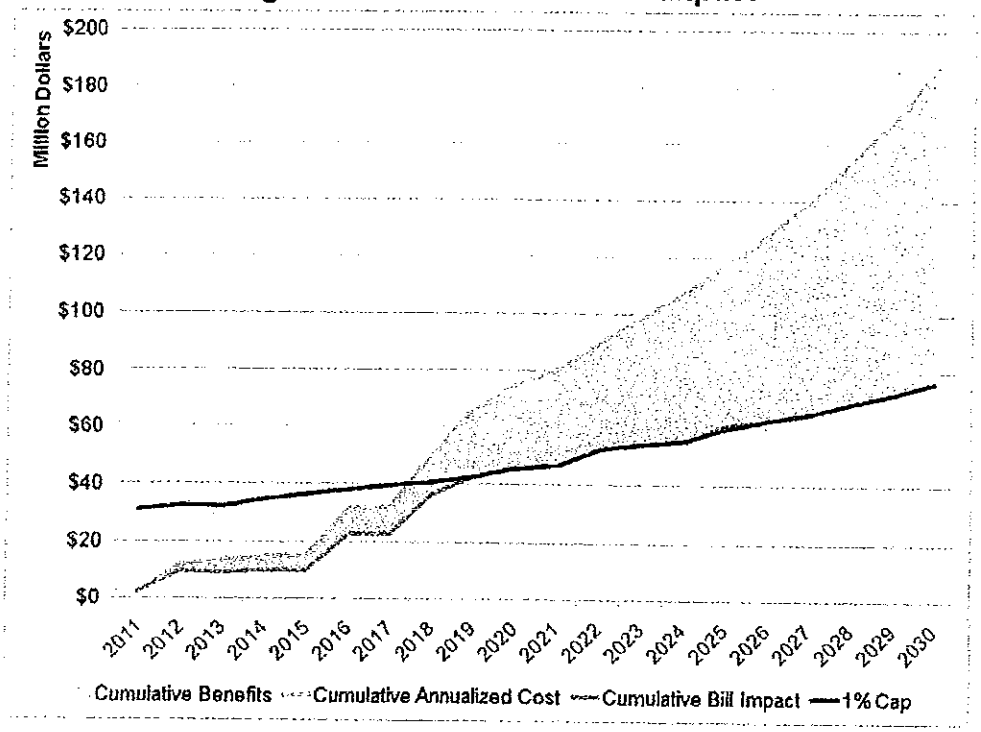


Figure 5.14 shows the cumulative rate impact throughout the planning horizon. The immediate rate impacts are caused by the solar needs. The rate cap is not reached until 2019 when additional non-solar resources are needed.

Figure 5.14 Missouri RES Bill Impact



Ex h. A

- Responses by potential vendors to an energy storage survey sent by Ameren for purposes of getting additional information and determining storage technology applicability and cost were very sparse – this was perceived as indicative of the overall state of the energy storage industry.

Additionally, there are a number of reasons in general why Ameren Missouri may not be able to develop as strong a business case for energy storage as other utilities:

- Ameren Missouri is not currently operating in a capacity-constrained environment from either a generation or energy delivery standpoint.
- Ameren Missouri is not currently operating in a real estate-constrained environment. When line or substation capacity additions are necessary, Ameren Missouri is not typically hampered by physical constraints associated with the expansion and upgrade of facilities.
- Ameren Missouri is not currently subject to the type of power market volatility that warrants the strategic use of energy storage from an arbitrage standpoint.
- Ameren Missouri is not currently hampered by the types of service reliability problems that would make energy storage a strategic option. In fact, as a direct a result of a number of reliability-based initiatives undertaken over the past several years, Ameren Missouri customers are experiencing measurably improved levels of electric service reliability.
- Ameren Missouri does not currently have a substantive amount of non-dispatchable intermittent resources in its generation portfolio to warrant a serious consideration of widespread energy storage.

Exh. A

regional use of the bulk electric system (BES) and the resulting impacts on the reliability of the Ameren Missouri transmission system. In the event that these studies forecast reduced reliability, additional studies evaluating all practical alternatives are performed to determine what, where and when system upgrades are required. These proposed solutions include applicable new technologies, e.g. Flexible AC Transmission System (FACTS) devices, high-temperature operation conductor, etc., as well as more traditional planning solutions. The total cost for maintaining system reliability is considered for the expansion options.

Ameren Missouri is an active participant in the Midwest ISO annual MTEP development process. We work with the Midwest ISO to coordinate and pursue activities associated with the planning, operation, and maintenance of the transmission system. Participation in the Midwest ISO MTEP process is the method by which Ameren Missouri's local transmission plan is "rolled-up" as a portion of the annual MTEP document and projects included in MTEP Appendix A. The MTEP process provides the opportunity to evaluate regional solutions that may more cost effectively resolve multiple local issues. Through these activities with the Midwest ISO, adjacent Transmission Owners, and stakeholders, Ameren Missouri works to provide a reliable system throughout the Midwest region and to ensure that opportunities for system expansion make sense and would provide the required system benefits while seeking a balance between regional and Ameren Missouri goals.

Ameren Missouri also participates in regional generation interconnection studies for proposed generation interconnections inside and outside of the Ameren Missouri footprint. Ameren Missouri responds to requests for proposals from Midwest ISO and performs studies of proposed generation interconnections to the Ameren Missouri system or alternatively, Ameren Missouri participates in the ad hoc stakeholder groups that oversee these studies. Participation in these activities ensures that the studies are performed on a consistent basis and that the proposed connections are integrated into the Ameren Missouri system to maintain system reliability. Powerflow, short-circuit, and stability analyses are performed to evaluate the system impacts of the requested interconnections. If system deficiencies are identified in the connection and system impact studies, additional studies are performed to refine the limitations and develop alternative solutions.

Ameren MTEP10 Projects (Appendix A)

Ameren Missouri has a total of 13 projects (six new projects in MTEP10 Appendix A) which have been approved by the Midwest ISO Board of Directors. These 13 projects have a total estimated cost of $82.6 Million. Nine of these projects are Baseline Reliability Projects which are required to meet NERC TPL reliability standards and have a total estimated cost of $58.5 Million. The remaining four projects are needed for a

Exh. A

variety of other reasons including generator interconnections, providing supply to new load connections, etc., and have a total estimated cost of $24.1 Million. Major projects include a new bulk substation and 161 kV supplies in the Troy area, addition of a second 345/138 kV transformer at Gray Summit Substation and reconductoring portions of the Sioux-Huster 138 kV lines. The complete Midwest ISO MTEP10 document and the list of Appendix A projects that have been approved by the Midwest ISO Board of Directors are available on MISO's website: www.MidwestISO.org. For convenience, the full MTEP10 report is contained in the electronic workpapers as "MISO MTEP10.pdf".

Ameren MVP Initiatives

Ameren Missouri is an active participant in the Midwest ISO initiative to identify major transmission projects which provide broad benefits across the Midwest ISO territory. The projects currently being analyzed are expected to be classified as Multi-Value Projects (MVPs). In order to be classified as an MVP, a project must meet the following criteria as defined in the Midwest ISO Tariff, Attachment FF:

A Multi Value Project must meet one of the three criteria outlined below:

a. Criterion 1. A Multi Value Project must be developed through the transmission expansion planning process for the purpose of enabling the Transmission System to reliably and economically deliver energy in support of documented energy policy mandates or laws that have been enacted or adopted through state or federal legislation or regulatory requirements that directly or indirectly govern the minimum or maximum amount of energy that can be generated by specific types of generation. The MVP must be shown to enable the transmission system to deliver such energy in a manner that is more reliable and/or more economic than it otherwise would be without the transmission upgrade.

b. Criterion 2. A Multi Value Project must provide multiple types of economic value across multiple pricing zones with a Total MVP Benefit-to-Cost ratio of 1.0 or higher where the Total MVP Benefit-to-Cost ratio is described in Section II.C.6 of this Attachment FF. The reduction of production costs and the associated reduction of LMPs resulting from a transmission congestion relief project are not additive and are considered a single type of economic value.

c. Criterion 3. A Multi Value Project must address at least one Transmission Issue associated with a projected violation of a NERC or Regional Entity standard and at least one economic-based Transmission Issue that provides economic value across multiple pricing zones. The project must generate total financially quantifiable benefits, including quantifiable reliability benefits, in

excess of the total project costs based on the definition of financial benefits and Project Costs provided in Section II.C.6 of Attachment FF.

To be classified as an MVP a project must meet additional specific criteria that are also contained in Attachment FF of the Midwest ISO Tariff.

The Midwest ISO and stakeholders are currently analyzing an initial set of transmission projects that have been identified as the Candidate MVP Portfolio. At this time the following transmission projects are included in the Candidate MVP Portfolio that would impact the Ameren Missouri transmission system

- Thomas Hill – West Adair – Ottumwa 345 kV line (105 miles): Expected to be in-service by June 1, 2016 with a preliminary cost estimate of $195 MM. The preliminary cost estimate includes both the Missouri and Iowa portions of the line.
- West Adair – Palmyra Tap 345 kV line: Expected to be in service by June 1, 2018 with a preliminary cost estimate of $100 MM.
- Palmyra Tap – Quincy IL 345 kV line: Expected to be in service by June 1, 2018 with a preliminary cost estimate of $27 MM. The preliminary cost estimate includes both the Missouri and Illinois portions of the line.

These projects will improve the efficiency of the transmission system by reducing losses, enhancing delivery of existing generation, and reducing congestion both within Missouri and between Missouri and the rest of the Midwest ISO. The analysis of these projects is expected to be completed during 2011 with the results documented in the Midwest ISO MTEP11 report.

6.1.4 Cost Allocation Assumptions for Modeling[3]

For modeling purposes, Ameren Missouri assumed the construction of projects necessary for the continued reliable and efficient operation of the transmission system. This included the assumption that the Midwest ISO analysis would determine that the full set of Candidate MVP Portfolio projects meet the criteria to be classified as MVP projects and subsequently would be approved by the Midwest ISO Board of Directors. The costs of MVPs would be allocated per the Midwest ISO Tariff and not be assigned to specific generation projects. Therefore, as the transmission interconnection costs of new generation facilities have been estimated, only the direct transmission interconnection costs have been included by assuming any relevant transmission backbone will be part of the MVPs.

Ameren Missouri assumed there would be a $25 billion MVP build-out over the next 25 years across the entire Midwest ISO territory with the investments hitting customer rates in $5 billion increments every 5 years. Adjusting for known changes in MISO

[3] 4 CSR 240-22.040(6); 4 CSR 240-22.040(3); EO-2007-0409 – Stipulation and Agreement #14

Exh. A

7. Demand-Side Resources

Highlights

- *Ameren Missouri has conducted a DSM Market Potential Study with primary data from its service territory to assess the potential for energy and demand savings*
- *A total of 425 demand side measures have been evaluated*
- *Ameren Missouri plans to spend nearly $60 million over 3 years on energy efficiency programs to obtain nearly 253 GWh of energy savings and over 54 MW of peak demand savings.*
- *Business Custom Program incentive levels increased by over 50% from prior implementation plan levels.*
- *The budget for the Residential HVAC program has increased more than 25% from the Cycle 1 budget to position it as one of the premier program offerings.*
- *The innovative Multi-family Income Qualified program will continue and may be expanded depending on how Ameren Missouri and stakeholders determine how best to serve hard-to-reach customer segments.*

Ameren Missouri has undertaken significant steps to improve and expand its consideration and evaluation of demand side resources. Chief among these is the development of a DSM Market Potential Study, which relies on primary market research within Ameren Missouri's franchise service territory. Using the results of this study, Ameren Missouri has developed a range of potential DSM portfolios for evaluation in the integration and risk portions of the IRP analysis.

7.1 Implementation Plan Summary

7.1.1 Introduction

The implementation plan covers a three year period beginning on January 1, 2012 and extending through December 31, 2014. The following table summarizes the estimated energy and demand savings and costs estimated for this period.

Table 7. 1: Estimated Incremental Savings and Costs for the Implementation Period - LOW RISK Portfolio

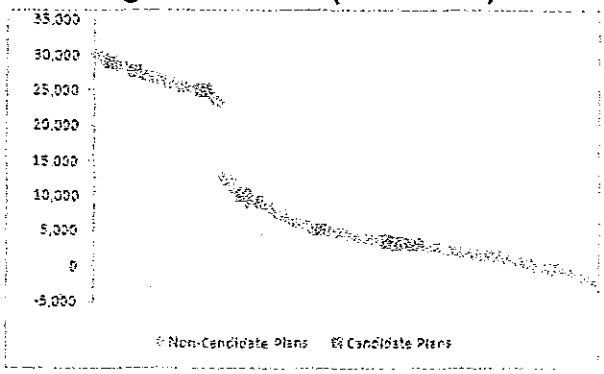
	2012	2013	2014
Estimated energy savings (MWh)	100,378	80,393	73,064
Estimated demand reduction (MW)	18	17	19
Estimated costs (Program costs in millions)*	$ 20.50	$ 18.76	$ 20.17

Exh. A

Economic Development (10% Weighting)

Economic development was represented by each plan's full-time-equivalent job impact, and is shown for each of the 216 alternative resource plans in Figure 9.8. When the value of the Meramec attribute was "Retire", the total overall jobs were relatively low or negative since there were in some cases not enough jobs created by the implementation of other resources to offset those lost jobs at Meramec. On the high end of this measure, both the 30% ownership nuclear and the 50% ownership nuclear supply side types and some of the DSM-only supply side types had relatively high numbers of jobs compared to other plans.

Figure 9.8 Jobs (FTE-Years)



The FTE-year estimates for each major resource option are shown in Table 9.3 and are intended to be comparable and indicative of the different resource types. The estimates are also limited to the direct economic impact; that is, only those jobs that are directly connected to delivery of the resource. The FTE-years estimates for coal, natural gas, and wind were derived from the National Renewable Energy Laboratory's (NREL) Jobs and Economic Development Impacts (JEDI) models, which are publicly available. The Nuclear estimates were from a 2008 Development Strategies study assessing the economic impact of a new 1600 MW unit added at the Callaway site. For purposes of our analysis and screening, the entire total of jobs for nuclear were used regardless of the amount assumed to be owned by Ameren Missouri since the entire plant would have to be built to be a viable resource. The jobs for pumped storage were based on Ameren Missouri's recent experience with rebuilding its Taum Sauk facility. In estimating the economic impacts of the energy efficiency portfolios, Ameren Missouri assigned each program to an appropriate economic activity group that

Table 9.3 FTE-Year Estimates

Coal w/CCS	7,182	68
CC-Greenfield	1,512	30
CC-Meramec	1,950	42
CC-Venice	937	30
SC-Greenfield	1,156	35
Pumped Storage	3,400	6
Nuke 30%	23,680	400
Nuke 50%	23,680	400
Wind/SC	977	54
MAP	26,790	
RAP	11,960	
Low Risk	3,490	

Exh. A

could be modeled using IMPLAN multipliers. This approach is consistent with how such economic impacts are typically modeled.

Energy Efficiency (10% Weighting)

Energy efficiency spending, 10% weight, was represented by spending on energy efficiency for the value levels of this sub-attribute of DSM. In rating the energy efficiency portfolios MAP was given the highest score of 1 with RAP plans receiving 0.9. The relatively low trade-off in the scoring is consistent with the definitions of the portfolios and RAP being an aggressive portfolio with the most realistic representation of achievable savings. The Low Risk portfolio was given a score of 0.1 while the plans without DSM received a score of 0.

Table 9.4 shows scoring results for a selection of the 216 alternative resource plans. The selection includes plans with only the Proposition C renewable portfolio and Meramec retirement in 2022 and excludes plans with no DSM. This scoring summary provides representative relative performance between the major resource options considered and provides a quantitative basis for the conclusions drawn from this phase of the analysis.

Table 9.4 Scorecard for Selected Alternative Resource Plans

	Category->	Environmental/ Renewable Resource Diversity	Energy Efficiency	Financial/ Regulatory	Customer Satisfaction	Economic Development	Cost
	Weight->	20%	10%	20%	15%	10%	25%
Noranda Status	Plan Type	Unitized Score	Unitized Total plan carbon emissions	Unitized Energy Efficiency parameter	Unitized Free Cash Flow	Unitized blend single yr max & 20yr avg [illegible]	Unitized Primary Jobs Growth (FTE-years)	Unitized PVRR
Noranda continues	DSM only MAP case	0.832	0.922	1.000	0.687	0.879	0.839	0.941
	DSM only RAP case	0.836	0.921	0.900	0.762	0.878	0.378	0.944
	Nuke 30% Low Risk case	0.739	0.921	0.100	0.590	0.594	0.962	0.905
	Nuke 50% Low Risk case	0.719	0.922	0.100	0.585	0.576	0.962	0.899
	SC greenfield Low Risk case	0.685	0.910	0.100	0.604	0.947	0.161	0.914
	CC Meramec Low Risk case	0.681	0.903	0.100	0.607	0.822	0.187	0.910
	CC greenfield Low Risk case	0.678	0.905	0.100	0.599	0.815	0.170	0.911
	CC Venice Low Risk case	0.677	0.902	0.100	0.603	0.817	0.153	0.912
	Wind with SC Low Risk case	0.665	0.915	0.100	0.653	0.557	0.160	0.906
	Pumped Storage Low Risk case	0.659	0.920	0.100	0.612	0.639	0.222	0.896
	Coal with CCS Low Risk case	0.638	0.916	0.100	0.582	0.484	0.351	0.875
Noranda retires 2026	DSM only MAP case	0.838	0.925	1.000	0.971	0.862	0.839	0.981
	DSM only RAP case	0.836	0.923	0.900	0.746	0.863	0.378	0.980
	Nuke 30% Low Risk case	0.765	0.924	0.100	0.593	0.832	0.925	0.947
	Nuke 50% Low Risk case	0.753	0.926	0.100	0.631	0.841	0.900	0.943
	CC Meramec Low Risk case	0.702	0.910	0.100	0.598	0.898	0.181	0.952
	Wind with SC Low Risk case	0.699	0.918	0.100	0.617	0.863	0.157	0.949
	SC greenfield Low Risk case	0.698	0.914	0.100	0.603	0.871	0.156	0.955
	CC greenfield Low Risk case	0.696	0.909	0.100	0.597	0.865	0.168	0.952
	CC Venice Low Risk case	0.694	0.907	0.100	0.600	0.865	0.150	0.953
	Pumped Storage Low Risk case	0.690	0.921	0.100	0.606	0.785	0.222	0.940
	Coal with CCS Low Risk case	0.660	0.919	0.100	0.574	0.582	0.349	0.919

Exh. A

Table 9.9 includes the uncertain factor for project schedule. It is noteworthy that as the number of years in a project schedule change, the distribution of the cash flows was also updated to be consistent with those changes.

Table 9.10 Uncertain Factor Ranges

Uncertain Factor	Low	Base	High
Probability ->>	20%	60%	20%
Wind Capacity Factor	31.4%	37.6%	43.5%
Nuclear Fuel Price		varies by year	
Long Term Int. Rates	5.7%	7.2%	8.4%
Return on Equity	10.16%	11.35%	13.27%
Energy Efficiency Load Impact			
MAP	69%	96%	113%
RAP	74%	99%	115%
Low Risk	73%	100%	112%
Demand Response Load Impact			
MAP	72%	100%	118%
RAP	75%	100%	116%
Low Risk	73%	100%	112%
DSM Cost			
MAP	90%	100%	110%
RAP	90%	100%	110%
Low Risk	90%	100%	110%

The two candidate independent uncertain factors that had 2 value levels instead of the typical low/base/high structure were off-system sales and nuclear tax incentives.

As a default, with a 50% probability, off-system sales included no premium to achieve market sales or purchases. As an alternative, with a 50% probability, off-system sales were limited to those after a $10 premium was required to achieve market sales or purchases.

As a default, with a 75% probability, no nuclear tax incentives were included. As an alternative, with a 25% probability, a 10% tax credit plus the reduction of tax depreciation life from 15 to 5 years were included for nuclear plants.

9.2.2 Sensitivity Analysis Results

To conduct sensitivity analysis, each of the 16 preliminary candidate resource plans was analyzed using the varying value levels (low/base/high or default/alternative) for each of the 13 candidate independent uncertain factors, for each of the scenarios in the probability tree. A scenario-probability-weighted result (PVRR) was obtained for each plan for each relevant candidate uncertain factor. Finally, the results of using a "non-base" value were compared to the results of using a base value for each plan for each

Exh. A

9.3.4 Risk Analysis 2.0 Results

Figures 9.16, 9.17 and 9.18 show the PVRR results of the risk analysis for the 14 candidate resource plans. The comparisons are grouped by resource type to facilitate the comparisons of different Meramec outcomes. Figure 9.16 shows the results under the Energy Bill Mandates scenarios while figure 9.17 shows the results under the Cap and Trade scenarios, and Figure 9.18 shows the results across all of the planning scenarios. It is evident from these results that continuing to operate Meramec without significant additional environmental controls will yield the lowest PVRRs. It is also evident that the supply-side resource options are performing very similarly while the DSM-only plans yield the lowest PVRRs. Other performance measures can be found in Chapter 9 – Appendix A.[26]

Figure 9.16

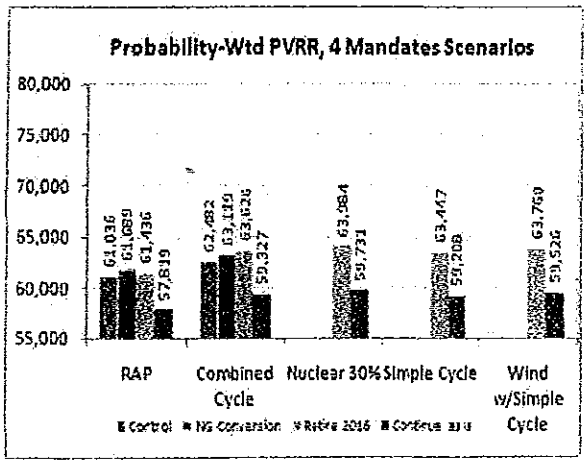


Figure 9.17

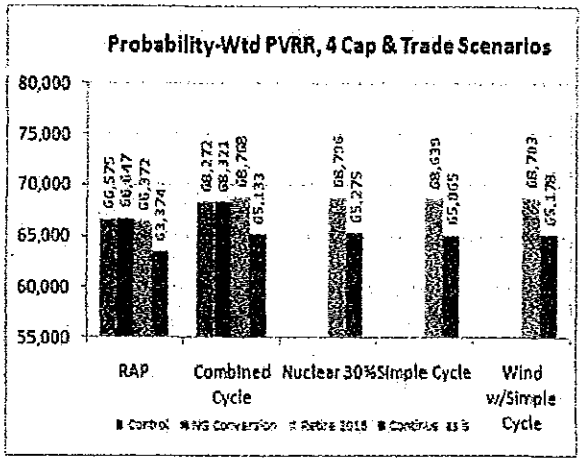
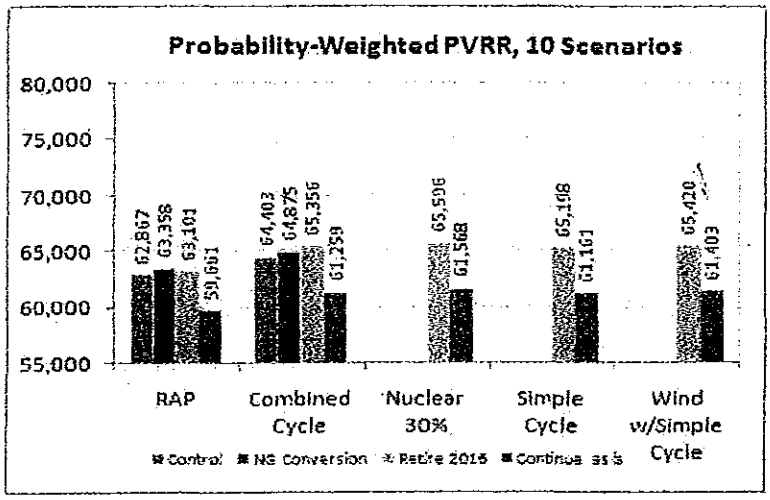


Figure 9.18



Realistic Achievable Potential DSM

[26] 4 CSR 240-22.060(A); 4 CSR 240-22.060(6)(B); 4 CSR 240-22.060(6)(C)(1 through 10); 4 CSR 240-22.070(5); 4 CSR 240-22.070(5)(A); 4 CSR 240-22.070(5)(B)

Exh. A

Demand-Side Resources Financing

As we have determined based on the results of the IRP analysis, demand-side resources carry the lowest overall resource cost but are constrained by the misalignment of financial incentives with the goal of helping customer use energy more efficiently. The analysis discussed in Section 10.1.1 indicates the need for a complete framework of appropriate program cost recovery, lost revenue recovery, and incentives. The passage of MEEIA has created a new process that includes Commission approval of demand-side management programs, but those rules have not been fully promulgated as of this IRP filing. Ameren Missouri will continue to advocate for better alignment of utility financial incentives to ultimately support the state's goal of achieving all cost-effective DSM.

Combined Cycle

Initially, the supply-side screening analysis included three combined cycle options: greenfield, Venice conversion, and retrofit at Meramec. As our analysis proceeded it became evident that the three options were nearly indistinguishable from a cost standpoint and Ameren Missouri continued to analyze the greenfield option to represent the combined cycle resource option. However, to be prepared for implementation, particularly if the need is sooner than that shown in the Preferred Resource Plan, Ameren Missouri will need to perform further analysis to determine which specific option is best.

Nuclear

To preserve the nuclear resource option, Ameren Missouri will support legislation that allows utilities to recover the costs of successfully obtaining an early site permit.

Large Investment Planning

The analysis presented in Section 10.1.2 indicates the potential for significant financial stress caused by more stringent environmental regulations. Ameren Missouri will continue to explore regulatory and legislative opportunities to provide both the Company and the PSC with options to retain maximum flexibility with respect to resource options and financing during periods of significant additional investment.

Renewables

As outlined in Chapter 5, Ameren Missouri expects to be in compliance with the non-solar portion of Missouri's Renewable Energy Standard (RES) throughout the implementation period without the addition of new renewable resources. However, action is still needed to comply with the solar requirements. Ameren Missouri expects to comply through the acquisition of Solar Renewable Energy Credits (S-RECs) from three main sources: wholesale purchases, installation of solar panels at

Table 10.7
Solar Energy Needs

Year	Solar Requirement
2011	15,049
2012	15,312
2013	15,387
2014	38,718

Ex 4. A

Ameren's corporate headquarters, and Ameren Missouri's Standard Offer Contract. The Standard Offer Contract refers to the S-RECs purchased from customers who install and own qualifying solar facilities. It is expected a large portion of the S-RECs will be provided by wholesale purchases. Although final compliance is based on actual retail sales, Table 10.7 contains the forecasted amount of solar RECs needed.

Meramec

The ongoing capital costs, exclusive of environmental controls, to keep a plant of Meramec's vintage operating safely and reliably will be a key consideration in the eventual retirement decision. Ameren Missouri will continue to investigate those costs in detail to adequately support the continued analysis of Meramec's potential retirement.

Environmental

Ameren Missouri will conduct appropriate engineering studies to refine the cost estimates of environmental controls required to meet more stringent environmental regulations.

10.3.4 Monitoring Critical Uncertain Factors[6]

Figure 10.6 shows the Preferred Resource Plan along with a complete decision roadmap with various contingency options. Ameren Missouri will be monitoring the critical uncertain factors that would help determine whether the Preferred Resource Plan is still valid and whether contingency options should be pursued. Below is a description of how Company decision makers will be monitoring the factors most relevant to future resource decisions.

Carbon Policy

Ameren Missouri senior management and the Strategic Initiatives Group will monitor and evaluate developments on possible carbon legislation and potential carbon policy outcomes and discuss significant developments and changes. Absent the need for more frequent discussions, as determined by Ameren Missouri senior management at their sole discretion, these discussions will occur annually.

Gas Prices

The President and CEO of Ameren Missouri is updated at least annually by the Corporate Planning and Risk Management groups on trends and drivers of natural gas prices as part of the update on the drivers of forward commodity prices. Ameren Missouri senior management may, in its sole discretion, request more frequent updates to discuss significant changes in natural gas prices.

[6] EO-2007-0409 – Stipulation and Agreement #36; 4 CSR 240-22.070(10)(E)

Exh. A

EXHIBIT
Witness B 80
7.10.14

2013 IRP Updates

Ameren Missouri creates an integrated Resource Plan (IRP) every three years as a way of laying out our vision for meeting our customers' future energy needs in a safe, reliable manner. We recently updated our IRP for 2013. You may also read the entire 2011 IRP or the 2013 Updates.

2013 IRP Updates

- Executive Summary
- Technical Overview
- Planning Environment

Email us your thoughts and questions regarding the plan.

Share

1. Executive Summary

Ameren Missouri provides this Integrated Resource Plan ("IRP") Annual Update pursuant to the Missouri Public Service Commission's ("PSC" or "Commission") Electric Utility Resource Planning rules as a means of keeping the Commission and other stakeholders informed of changes in the planning environment since the filing of the Company's 2011 IRP and 2012 IRP Annual Update and the potential implications of those changes for future resource decisions.

As this is simply an update it cannot take the place of a full IRP analysis and report, as is required every three years. Rather, it provides transparency into the current and expected conditions, issues and considerations that are important to prudent resource planning decisions. In doing so, the analysis and discussion presented here highlight the fact that significant uncertainty remains with respect to key decision drivers, including environmental regulations, economic conditions, future fuel and power prices and other long-term market trends. As a result, maintaining effective resource options to meet our customers' future energy resource needs remains of paramount importance.

Environmental Regulation

The specific requirements of federal environmental regulations continue to evolve as new rules continue to be considered, drafted and implemented. While some requirements have become clearer since the filing of the Company's 2012 IRP Annual Update Report in April 2012, much uncertainty remains as additional rules are drafted and court challenges are heard. Ameren Missouri has continued to evaluate its plans for environmental compliance against its assumptions of known and expected regulations. This report reflects consideration of those regulations which have been finalized and certain potential regulations, while acknowledging that changes are still likely to occur.

In July 2011, the U.S. Environmental Protection Agency ("EPA") finalized the Cross-state Air Pollution Rule ("CSAPR"), to replace the Clean Air Interstate Rule ("CAIR") that was remanded to EPA by the courts in 2008. While CSAPR was stayed by the U.S. Court of Appeals in December 2011 and vacated in August 2012, our expectation is that the ultimate regulation will be very similar to that represented by the final CSAPR issued in July 2011.

Our plan to address those requirements included entering into a long-term contract for ultra-low sulfur coal that eliminated and/or deferred the need to make significant

Exh. B

investments in environmental control equipment by 2017, thus avoiding associated increases in customer electric rates.

In December 2011, EPA released its final Mercury and Air Toxics Standards ("MATS"). The requirements of the final rule were largely similar to the draft rule released by EPA in March 2011. Ameren Missouri has put in place plans for compliance with MATS at each of its existing coal-fired plants, which includes upgrading some of our electrostatic precipitators ("ESP") at our coal-fired power plants. As a result of these environmental regulations, as well as other potential environmental regulations, we continue to carefully evaluate compliance options at the Meramec plant, our oldest coal-fired generating plant. At this time, should no additional environmental regulations be promulgated that affect Meramec, continued operation of the plant may still be in the best interest of our customers and the state. However, much uncertainty continues to exist with respect to future environmental regulations as well as long-term market conditions. Further monitoring and analysis of this issue will be conducted as part of the Company's 2014 IRP development.

While more is known about the CSAPR and MATS rules than was known when the Company filed its 2011 IRP, the possibility still exists for further emission reduction requirements under these and/or other standards in the future. Rules for water use and coal combustion residuals (coal ash) are also expected to be promulgated in the next two years. Further, the potential impact of future rules limiting carbon emissions remains, especially in light of rules issued by the EPA for new coal-fired power plants and renewed talk of federal action on climate change through legislation and/or regulation. These additional emissions reductions and regulations could clearly have a significant impact on our future resource planning.

Resource Options

As we discussed in our 2012 IRP Annual Update Report, it is important to evaluate the potential for emerging technologies that may represent robust options for dealing with the uncertainties of the market. For its 2011 IRP, Ameren Missouri evaluated a host of demand side and supply side options. The top options were further analyzed as part of our 2012 IRP Annual Update. The supply side options included resources powered by renewable resources such as wind, lower-carbon fossil fueled resources such as simple cycle or combined cycle gas turbines, and zero-carbon resources such as nuclear generation.

While the Company's 2011 IRP evaluation of nuclear resources was based on large, single-unit reactor technology, emerging small modular reactor ("SMR") technologies were also assumed to be represented by the analysis because of the expected similarities in cost and operating performance characteristics. For the 2012 IRP Annual

Exh. B

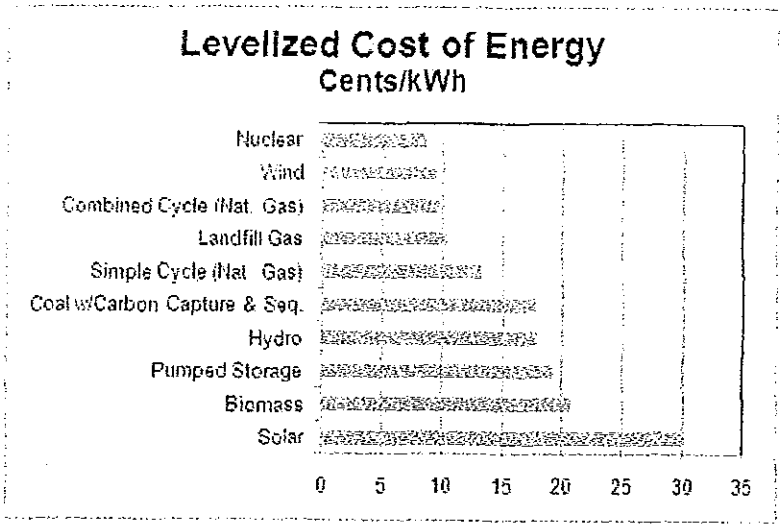
Update, the Company chose to specifically evaluate SMR technology as a resource option because of the increased flexibility it can provide in terms of operation, scalability, construction risk, and financing considerations.

Consistent with our commitment to taking proactive steps today to maintain generation options to meet our state's energy needs in the future, Ameren Missouri and Westinghouse Electric Company announced in April 2012 an alliance to apply for Department of Energy ("DOE") SMR investment funds of up to $452 million. The investment funding, initially announced by the DOE last March, will support first-of-its-kind engineering, design certifications and operating licenses for up to two SMR designs over five years.

The objectives of the DOE program are to support efforts for the United States to become the global leader in the design, engineering, manufacture and sale of American-made SMRs around the world, as well as expand our nation's options for nuclear power. This DOE program presents an opportunity for savings associated with design and operating license development costs. It also comes with a transformational economic development opportunity for the state of Missouri which includes becoming the hub for the engineering design, development, manufacturing and construction of American-made SMR technology in Missouri, in the United States and around the world. While the initial funding by DOE under this program was awarded to another alliance, program funding remains. On March 11, 2013, the DOE announced that it would accept applications through July 1, 2013, for up to $226 million in investment funding. The program, contingent on continued funding by Congress, aims for SMR deployment by 2022 and will cover up to 50% of the chosen projects' costs. Ameren Missouri and Westinghouse are currently studying this opportunity.

Figure 1.1 shows the levelized cost of energy ("LCOE") for a range of potential supply side resources. The costs for the nuclear resource represent the SMR technology. Because SMR technology is by definition modular, implementation of the technology requires shorter lead-times and construction schedules,

Figure 1.1 Levelized Cost of Energy



Exh. B

which results in significant savings in financing during construction. This savings results in a levelized cost of energy which is lower than that for wind or combined cycle gas turbines. In addition, the potential cost savings from DOE investment funding have not been factored into our analysis at this time. It is important to note that levelized cost of energy figures, while useful for convenient comparisons of resource alternatives, do not fully capture all of the relative strengths and challenges of each resource type. For example, wind resources are intermittent resources and therefore cannot be counted on for meeting peak demand requirements in the same way a nuclear or gas-fired resource can. The levelized cost of wind resources presented in Figure 1.1 also does not reflect the full cost of transmission infrastructure needed to integrate wind and other intermittent resources into the electric grid. Such costs are allocated to members of the Midwest Independent System Operator ("MISO") based on methods approved by the Federal Energy Regulatory Commission ("FERC").

The levelized cost of energy for future resource options is an important measure for assessing these options. However, it is not the only factor that must be considered in making resource decisions. Facts and conditions surrounding future environmental regulations, commodity market prices, economic conditions, economic development opportunities, and other factors must be considered as well. A robust range of uncertainty exists for many of these factors, all of which leads to one overriding conclusion – maintaining effective options to pursue alternative resource options in a timely fashion is a prudent course of action.

Natural Gas Prices

Significant changes have occurred in the market for natural gas in recent years and therefore in the long-term outlook for natural gas prices. Because of the developments in the extraction of domestic shale gas over the past few years, the Company's current forecasts for natural gas prices reflect a range of $4/MMBtu to $6/MMBtu average real prices over the planning horizon, as was the case in our 2012 IRP Annual Update.

One thing is clear with respect to natural gas prices – they can be volatile. In light of the significant changes we have seen in this area, this is an issue that will need to be closely monitored. While these market changes may result in low long-term prices for natural gas, future prices are subject to a host of changes in both supply and demand, including those driven by regulation, and are by no means assured.

Energy Efficiency

Ameren Missouri's 2011 IRP demonstrated that meaningful savings could be realized by customers through participation in energy efficiency programs. Our analysis also showed that under the previous regulatory treatment for investments in energy efficiency, the Company would suffer significant financial losses by implementing such

Ameren Missouri is now in the process of updating its assessment of DSM potential, which will be used in analysis as part of the Company's 2014 IRP and its next MEEIA filing, which is expected to be made in December 2014. Because our plans for continued implementation of energy efficiency programs are highly dependent on appropriate regulatory treatment and other factors, it is important to evaluate our potential resource needs under a variety of such circumstances.

Load Forecast and Resource Needs

Another factor that could affect the timing for new resources is load growth in our service territory. Several factors will impact long-term load growth, including general economic conditions and energy intensity. During the development of our 2011 IRP, we generally expected annual load growth to approximate 1%. Under that scenario, there could be a need for new resources in the 2026-2030 timeframe. This assumes that no additional environmental regulations or other meaningful changes in fuel prices, economic conditions, customer use or other factors take place. Should certain of these factors drive the closure of our Meramec plant by the 2020 timeframe, our need for new resources could be advanced to the 2021-2025 timeframe.

Since the filing of our 2011 IRP, recent data suggests that current economic conditions and efficiency have slowed load growth somewhat. Because of the number of factors and uncertainties that could influence load growth, it is important to assess this important factor within a range of possible values. Resource needs are highly dependent on load growth assumptions, the status of Meramec and the extent to which DSM programs are continued after our current 3-year DSM program plan. For this and other reasons, it remains prudent to preserve all available resource options to meet future customer demand.

Summary

As was mentioned at the outset, this document represents only an update on the conditions that affect resource planning decisions. As such, the discussion and analysis presented here must be viewed as a work in progress as better information is acquired with respect to environmental regulations, costs of building and operating various resource options, customers' energy usage, the way resources are treated in the ratemaking process, and economic development opportunities for the state of Missouri.

The Company continues to analyze the most attractive options identified in its 2011 IRP. With low prices for natural gas, gas-fired combined cycle generation continues to look attractive, with low capital costs and relatively low operating costs. Nuclear resources remain attractive as an option, particularly if natural gas prices continue to be volatile in the long run and in light of the uncertainties associated with existing and potential environmental regulations limiting carbon emissions. Another key factor to consider is

that its recently communicated preferred resource plan is still appropriate at this time. Should the Company's continued planning and consideration of relevant issues lead to a conclusion that its Preferred Resource Plan is no longer appropriate, the Company will notify the Commission of its decision in accordance with 4 CSR 240-22.080(12).

2.3 Status on Resolution of Deficiencies and Concerns

On March 28, 2012, the PSC issued its Report and Order on the Company's 2011 IRP (File EO-2011-0271). That order included the following areas of deficiency in the Company's filing:

- Evaluation of demand side resources compared to existing supply side resources
- Use of a two-year rate case cycle for analysis compared to the requirement to use an assumption of annual rate cases for computing Present Value Revenue Requirements ("PVRR")
- Analysis of wind resources, including analysis pursuant to a stipulation and agreement in File EO-2007-0409

Regarding the evaluation of existing supply side resources, the Company is including in its 2014 IRP work plan economic evaluation of all of its existing coal resources and has begun to develop long-range cost estimates for each coal-fired plant. More information regarding the Company's plans for this analysis will be shared as part of the stakeholder process for our 2014 IRP.

As was indicated in the Company's 2012 IRP Annual Update Report, all PVRR results in the Company's 2012 IRP Annual Update and its 2011 IRP reflected an assumption of annual rate cases. Ameren Missouri will continue to use this practice for calculating PVRR in its future IRP analysis.

The evaluation of the impact of both the existing RES and an alternative RES in the Company's 2012 IRP Annual Update clearly showed that the inclusion of additional wind as a stand-alone resource option results in an increase in costs to customers, even when the resource build is spread over many years and is not needed to meet capacity requirements. This is consistent with the results of the RES compliance analysis included in the 2011 IRP and satisfies the first portion of the deficiency related to wind analysis.

Regarding the stipulation portion of the wind analysis deficiency, Ameren Missouri has engaged Black and Veatch to perform an analysis of wind resources consistent with the agreement made with the Missouri Department of Natural Resources ("MDNR") in File EO-2007-0409. Specifically, the following scope of work, which was reviewed and agreed to by MDNR, is being performed:

Exh. B

- For each state in the 11-state (North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Minnesota, Iowa, Missouri, Wisconsin, Illinois, and Indiana) region identified in Ameren Missouri's 2011 IRP, identify at least one multi-county area that represents a highly desirable location for development of wind resources
    - The selection of these multi-county areas will be based on an overlay of GIS wind maps at 80, 100, and 120 meter hub heights with transmission system maps that represent both the current transmission system and also reasonably expected transmission system expansions during the planning horizon based on current regional transmission organization ("RTO") expansion plans
    - For each multi-county area, the relevant RTO will be identified
    - At least one multi-county area within the MISO system will be identified for each state identified above in which MISO operates
    - At least two multi-county areas will be identified in Missouri
- Direct transmission interconnection costs (those attributable directly to the project for connection to the bulk transmission system) will be estimated on a generic basis (i.e., distance and cost per mile)
- The LCOE will be calculated for each multi-county area at 80, 100 and 120 meter hub heights, including transmission-related costs attributable to wind projects
- Levelized cost will be calculated both with and without continuation of federal Investment Tax Credits
- The generic projects and associated costs characterized by the identified multi-county areas will be used to develop wind supply curves to be used by Ameren Missouri to appropriately assess wind resources for Ameren Missouri for at least the following purposes:
    - Satisfaction of any state or federal RES compliance requirements
    - Use as capacity and/or energy resources needed to meet customer load (i.e., as a supply side resource alternative)
    - Supply curves used for the above purposes may be limited by geographical or RTO deliverability constraints as appropriate

Ameren Missouri will review the results of this analysis with stakeholders as part of discussions for the preparation of its 2014 IRP.

2.4 Implementation of Current Preferred Resource Plan

Ameren Missouri filed a notice of change in Preferred Resource Plan with the PSC on February 8, 2013. In that filing, the Company indicated that its new Preferred Resource Plan includes implementation of the approved 3-year energy efficiency program plan as well as continued pursuit of DSM programs through the entire planning horizon at the

Exh. B

American-made SMRs around the world, as well as expand our nation's options for nuclear power.

This DOE program presents an opportunity for savings associated with operating license development cost. It also comes with a transformational economic development opportunity which includes becoming the hub for the engineering design, development, manufacturing and construction of American-made SMR technology in Missouri, in the United States and around the world. While the initial funding by DOE under this program was awarded to another alliance, program funding remains. On March 11, 2013, the DOE announced that it would accept applications through July 1, 2013, for up to $226 million in investment funding. The program, contingent on continued funding by Congress, aims for SMR deployment by 2022 and will cover up to 50% of the chosen projects' costs. Ameren Missouri and Westinghouse are currently studying this opportunity.

Baseload Investment Financing

Ameren Missouri plans to continue evaluating the financial feasibility of all resource options, including those which require significantly large investments of capital, such as a baseload power plant.

Renewable Energy Standard Compliance

Ameren Missouri does not expect to need new resources to meet the non-solar renewable energy requirement of the existing Missouri RES through 2018. However, the Company must acquire solar renewable energy credits ("SRECs") to comply with the solar requirements, whether through market purchases or through installation of new company-owned solar generation resources. Ameren Missouri will file its next required annual report and compliance plan with the Commission in April 2013.

Meramec Long-run Costs

Ameren Missouri continues to evaluate the long-run costs of operation of the Meramec plant in the context of its ongoing environmental compliance analysis. As mentioned in this report, the Company will be evaluating all of its coal-fired resources as part of its 2014 IRP analysis.

Refinement of Environmental Retrofit Costs

The Company continues to refine its estimates for environmental controls as part of its ongoing environmental compliance analysis.

Exh. B

THIS FILING IS	
Item 1: [X] An Initial (Original) Submission	OR [ ] Resubmission No. ____

Form 1 Approved
OMB No.1902-0021
(Expires 12/31/2014)
Form 1-F Approved
OMB No.1902-0029
(Expires 12/31/2014)
Form 3-Q Approved
OMB No.1902-0205
(Expires 05/31/2014)

FERC FINANCIAL REPORT
FERC FORM No. 1: Annual Report of Major Electric Utilities, Licensees and Others and Supplemental Form 3-Q: Quarterly Financial Report

These reports are mandatory under the Federal Power Act, Sections 3, 4(a), 304 and 309, and 18 CFR 141.1 and 141.400. Failure to report may result in criminal fines, civil penalties and other sanctions as provided by law. The Federal Energy Regulatory Commission does not consider these reports to be of confidential nature

EXHIBIT
No. C 56
7-10-14

Exact Legal Name of Respondent (Company)	Year/Period of Report
Union Electric Company - MO Basis	End of 2013/Q4

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

PURCHASES AND SALES OF ANCILLARY SERVICES

Report the amounts for each type of ancillary service shown in column (a) for the year as specified in Order No. 888 and defined in the respondents Open Access Transmission Tariff.

In columns for usage, report usage-related billing determinant and the unit of measure.

(1) On line 1 columns (b), (c), (d), (e), (f) and (g) report the amount of ancillary services purchased and sold during the year.

(2) On line 2 columns (b) (c), (d), (e), (f), and (g) report the amount of reactive supply and voltage control services purchased and sold during the year.

(3) On line 3 columns (b) (c), (d), (e), (f), and (g) report the amount of regulation and frequency response services purchased and sold during the year.

(4) On line 4 columns (b), (c), (d), (e), (f), and (g) report the amount of energy imbalance services purchased and sold during the year.

(5) On lines 5 and 6, columns (b), (c), (d), (e), (f), and (g) report the amount of operating reserve spinning and supplement services purchased and sold during the period.

(6) On line 7 columns (b), (c), (d), (e), (f), and (g) report the total amount of all other types ancillary services purchased or sold during the year. Include in a footnote and specify the amount for each type of other ancillary service provided.

		Amount Purchased for the Year			Amount Sold for the Year		
		Usage - Related Billing Determinant			Usage - Related Billing Determinant		
Line No.	Type of Ancillary Service (a)	Number of Units (b)	Unit of Measure (c)	Dollars (d)	Number of Units (e)	Unit of Measure (f)	Dollars (g)
1	Scheduling, System Control and Dispatch			424,291			732,667
2	Reactive Supply and Voltage			1,185,391			9,305,985
3	Regulation and Frequency Response			1,483,908			3,992,755
4	Energy Imbalance						
5	Operating Reserve - Spinning			2,218,328			3,544,908
6	Operating Reserve - Supplement			1,201,918			4,086,415
7	Other						915,398
8	Total (Lines 1 thru 7)			6,513,836			20,747,332

Exh. C

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

ELECTRIC ENERGY ACCOUNT

Report below the information called for concerning the disposition of electric energy generated, purchased, exchanged and wheeled during the year.

Line No.	Item (a)	MegaWatt Hours (b)	Line No.	Item (a)	MegaWatt Hours (b)
1	SOURCES OF ENERGY		21	DISPOSITION OF ENERGY	
2	Generation (Excluding Station Use):		22	Sales to Ultimate Consumers (Including Interdepartmental Sales)	37,030,285
3	Steam	33,329,701	23	Requirements Sales for Resale (See instruction 4, page 311.)	28,330
4	Nuclear	8,367,103	24	Non-Requirements Sales for Resale (See instruction 4, page 311.)	6,099,523
5	Hydro-Conventional	1,406,179	25	Energy Furnished Without Charge	
6	Hydro-Pumped Storage	260,891	26	Energy Used by the Company (Electric Dept Only, Excluding Station Use)	
7	Other	212,208	27	Total Energy Losses	1,843,260
8	Less Energy for Pumping	363,154	28	TOTAL (Enter Total of Lines 22 Through 27) (MUST EQUAL LINE 20)	45,001,398
9	Net Generation (Enter Total of lines 3 through 8)	43,212,928			
10	Purchases	1,788,470			
11	Power Exchanges:				
12	Received				
13	Delivered				
14	Net Exchanges (Line 12 minus line 13)				
15	Transmission For Other (Wheeling)				
16	Received	15,285,035			
17	Delivered	15,285,035			
18	Net Transmission for Other (Line 16 minus line 17)				
19	Transmission By Others Losses				
20	TOTAL (Enter Total of lines 9, 10, 14, 18 and 19)	45,001,398			

Exh. C

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

STEAM-ELECTRIC GENERATING PLANT STATISTICS (Large Plants) *(Continued)*

1. Report data for plant in Service only. 2. Large plants are steam plants with installed capacity (name plate rating) of 25,000 Kw or more. Report in this page gas-turbine and internal combustion plants of 10,000 Kw or more, and nuclear plants. 3. Indicate by a footnote any plant leased or operated as a joint facility. 4. If net peak demand for 60 minutes is not available, give data which is available, specifying period. 5. If any employees attend more than one plant, report on line 11 the approximate average number of employees assignable to each plant. 6. If gas is used and purchased on a therm basis report the Btu content or the gas and the quantity of fuel burned converted to Mct. 7. Quantities of fuel burned (Line 38) and average cost per unit of fuel burned (Line 41) must be consistent with charges to expense accounts 501 and 547 (Line 42) as show on Line 20. 8. If more than one fuel is burned in a plant furnish only the composite heat rate for all fuels burned.

Line No.	Item (a)	Plant Name: *Venice* (b)			Plant Name: *Maryland Heights LF* (c)		
1	Kind of Plant (Internal Comb, Gas Turb, Nuclear	Steam			Gas Turbine		
2	Type of Constr (Conventional, Outdoor, Boiler, etc)	Conventional			Outdoor Const.		
3	Year Originally Constructed	1942			2012		
4	Year Last Unit was Installed	1950			2012		
5	Total Installed Cap (Max Gen Name Plate Ratings-MW)	0.00			15.00		
6	Net Peak Demand on Plant - MW (60 minutes)	0			11		
7	Plant Hours Connected to Load	0			6324		
8	Net Continuous Plant Capability (Megawatts)	0			10		
9	When Not Limited by Condenser Water	0			11		
10	When Limited by Condenser Water	0			8		
11	Average Number of Employees	0			0		
12	Net Generation, Exclusive of Plant Use - KWh	0			62678202		
13	Cost of Plant: Land and Land Rights	0			28856		
14	Structures and Improvements	0			6003212		
15	Equipment Costs	0			36814783		
16	Asset Retirement Costs	155546			0		
17	Total Cost	155546			42846851		
18	Cost per KW of Installed Capacity (line 17/5) Including	0			2856.4567		
19	Production Expenses: Oper, Supv, & Engr	0			0		
20	Fuel	0			2398108		
21	Coolants and Water (Nuclear Plants Only)	0			0		
22	Steam Expenses	0			0		
23	Steam From Other Sources	0			0		
24	Steam Transferred (Cr)	0			0		
25	Electric Expenses	0			151915		
26	Misc Steam (or Nuclear) Power Expenses	0			5502		
27	Rents	0			0		
28	Allowances	0			0		
29	Maintenance Supervision and Engineering	0			79215		
30	Maintenance of Structures	0			414387		
31	Maintenance of Boiler (or reactor) Plant	0			0		
32	Maintenance of Electric Plant	0			645382		
33	Maintenance of Misc Steam (or Nuclear) Plant	0			13612		
34	Total Production Expenses	0			3708121		
35	Expenses per Net KWh	0.0000			0.0592		
36	Fuel: Kind (Coal, Gas, Oil, or Nuclear)	Gas	Oil		Gas		
37	Unit (Coal-tons/Oil-barrel/Gas-mcf/Nuclear-indicate)	Mcf	Bbl		Mcf		
38	Quantity (Units) of Fuel Burned	0	0	0	820319	0	0
39	Avg Heat Cont - Fuel Burned (btu/indicate if nuclear)	0	0	0	1000	0	0
40	Avg Cost of Fuel/unit, as Delvd f.o.b. during year	0.000	0.000	0.000	2.946	0.000	0.000
41	Average Cost of Fuel per Unit Burned	0.000	0.000	0.000	2.946	0.000	0.000
42	Average Cost of Fuel Burned per Million BTU	0.000	0.000	0.000	2.946	0.000	0.000
43	Average Cost of Fuel Burned per KWh Net Gen	0.000	0.000	0.000	0.038	0.000	0.000
44	Average BTU per KWh Net Generation	0.000	0.000	0.000	13088.000	0.000	0.000

Exh. C

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

STEAM-ELECTRIC GENERATING PLANT STATISTICS (Large Plants) *(Continued)*

1. Report data for plant in Service only. 2. Large plants are steam plants with installed capacity (name plate rating) of 25,000 Kw or more. Report in this page gas-turbine and internal combustion plants of 10,000 Kw or more, and nuclear plants. 3. Indicate by a footnote any plant leased or operated as a joint facility. 4. If net peak demand for 60 minutes is not available, give data which is available, specifying period. 5. If any employees attend more than one plant, report on line 11 the approximate average number of employees assignable to each plant. 6. If gas is used and purchased on a therm basis report the Btu content or the gas and the quantity of fuel burned converted to Mcf. 7. Quantities of fuel burned (Line 38) and average cost per unit of fuel burned (Line 41) must be consistent with charges to expense accounts 501 and 547 (Line 42) as show on Line 20. 8. If more than one fuel is burned in a plant furnish only the composite heat rate for all fuels burned.

Line No.	Item (a)	Plant Name: *Callaway* (b)	Plant Name: *Venice C.T.* (c)
1	Kind of Plant (Internal Comb, Gas Turb, Nuclear	Nuclear	Gas Turbine
2	Type of Constr (Conventional, Outdoor, Boiler, etc)	Conventional	Outdoor Const.
3	Year Originally Constructed	1984	1967
4	Year Last Unit was Installed	1984	2005
5	Total Installed Cap (Max Gen Name Plate Ratings-MW)	1235.80	576.20
6	Net Peak Demand on Plant - MW (60 minutes)	1251	485
7	Plant Hours Connected to Load	7008	219
8	Net Continuous Plant Capability (Megawatts)	1220	521
9	When Not Limited by Condenser Water	1239	564
10	When Limited by Condenser Water	1190	487
11	Average Number of Employees	868	6
12	Net Generation, Exclusive of Plant Use - KWh	8367103000	40546000
13	Cost of Plant: Land and Land Rights	9793885	358276
14	Structures and Improvements	917353077	13863298
15	Equipment Costs	1940738371	192129190
16	Asset Retirement Costs	-32639472	0
17	Total Cost	2835245861	206350764
18	Cost per KW of Installed Capacity (line 17/5) Including	2294.2595	358.1235
19	Production Expenses: Oper, Supv, & Engr	32256441	395741
20	Fuel	78768508	2997421
21	Coolants and Water (Nuclear Plants Only)	0	0
22	Steam Expenses	0	0
23	Steam From Other Sources	0	0
24	Steam Transferred (Cr)	0	0
25	Electric Expenses	16043	257143
26	Misc Steam (or Nuclear) Power Expenses	48358652	420893
27	Rents	400	0
28	Allowances	0	0
29	Maintenance Supervision and Engineering	17459750	12416
30	Maintenance of Structures	8478164	64950
31	Maintenance of Boiler (or reactor) Plant	23017800	0
32	Maintenance of Electric Plant	14743979	1354398
33	Maintenance of Misc Steam (or Nuclear) Plant	11041342	86175
34	Total Production Expenses	234141079	5589137
35	Expenses per Net KWh	0.0280	0.1378
36	Fuel: Kind (Coal, Gas, Oil, or Nuclear)	Nuclear	Gas / Oil
37	Unit (Coal-tons/Oil-barrel/Gas-mcf/Nuclear-indicate)	Mmbtu	Mcf / Bbl
38	Quantity (Units) of Fuel Burned	83609804 / 0 / 0	455352 / 0 / 0
39	Avg Heat Cont - Fuel Burned (btu/indicate if nuclear)	0 / 0 / 0	1018 / 0 / 0
40	Avg Cost of Fuel/unit, as Delvd f.o.b. during year	0.000 / 0.000 / 0.000	6.633 / 0.000 / 0.000
41	Average Cost of Fuel per Unit Burned	0.942 / 0.000 / 0.000	6.633 / 0.000 / 0.000
42	Average Cost of Fuel Burned per Million BTU	0.942 / 0.000 / 0.000	6.515 / 0.000 / 0.000
43	Average Cost of Fuel Burned per KWh Net Gen	0.009 / 0.000 / 0.000	0.074 / 0.000 / 0.000
44	Average BTU per KWh Net Generation	9993.000 / 0.000 / 0.000	11435.000 / 0.000 / 0.000

Exh. C

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

STEAM-ELECTRIC GENERATING PLANT STATISTICS (Large Plants)

1. Report data for plant in Service only. 2. Large plants are steam plants with installed capacity (name plate rating) of 25,000 Kw or more. Report in this page gas-turbine and internal combustion plants of 10,000 Kw or more, and nuclear plants. 3. Indicate by a footnote any plant leased or operated as a joint facility. 4. If net peak demand for 60 minutes is not available, give data which is available, specifying period. 5. If any employees attend more than one plant, report on line 11 the approximate average number of employees assignable to each plant. 6. If gas is used and purchased on a therm basis report the Btu content or the gas and the quantity of fuel burned converted to Mct. 7. Quantities of fuel burned (Line 38) and average cost per unit of fuel burned (Line 41) must be consistent with charges to expense accounts 501 and 547 (Line 42) as show on Line 20. 8. If more than one fuel is burned in a plant furnish only the composite heat rate for all fuels burned.

Line No.	Item (a)	Plant Name: *Labadie* (b)			Plant Name: *Sioux* (c)		
1	Kind of Plant (Internal Comb, Gas Turb, Nuclear	Steam			Steam		
2	Type of Constr (Conventional, Outdoor, Boiler, etc)	Conventional			Indoor Boiler		
3	Year Originally Constructed	1970			1967		
4	Year Last Unit was Installed	1973			1968		
5	Total Installed Cap (Max Gen Name Plate Ratings-MW)	2406.50			1099.60		
6	Net Peak Demand on Plant - MW (60 minutes)	2448			902		
7	Plant Hours Connected to Load	8760			8638		
8	Net Continuous Plant Capability (Megawatts)	2428			987		
9	When Not Limited by Condenser Water	2461			994		
10	When Limited by Condenser Water	2374			972		
11	Average Number of Employees	281			178		
12	Net Generation, Exclusive of Plant Use - KWh	17294713000			5080395000		
13	Cost of Plant: Land and Land Rights	1253099			1682534		
14	Structures and Improvements	65770202			52298859		
15	Equipment Costs	1083510908			1157941741		
16	Asset Retirement Costs	6004333			7740618		
17	Total Cost	1156538542			1219663752		
18	Cost per KW of Installed Capacity (line 17/5) Including	480.5895			1109.1886		
19	Production Expenses: Oper, Supv, & Engr	1293577			2083952		
20	Fuel	353171593			115460904		
21	Coolants and Water (Nuclear Plants Only)	0			0		
22	Steam Expenses	1336005			5123943		
23	Steam From Other Sources	0			0		
24	Steam Transferred (Cr)	0			0		
25	Electric Expenses	5952000			2773712		
26	Misc Steam (or Nuclear) Power Expenses	5415700			3579174		
27	Rents	0			18017		
28	Allowances	0			0		
29	Maintenance Supervision and Engineering	3851941			2295527		
30	Maintenance of Structures	1739169			1859568		
31	Maintenance of Boiler (or reactor) Plant	12701163			12899224		
32	Maintenance of Electric Plant	1937305			928091		
33	Maintenance of Misc Steam (or Nuclear) Plant	4690739			1649323		
34	Total Production Expenses	392089192			148671435		
35	Expenses per Net KWh	0.0227			0.0293		
36	Fuel: Kind (Coal, Gas, Oil, or Nuclear)	Coal	Oil		Coal	Oil	Refuse
37	Unit (Coal-tons/Oil-barrel/Gas-mcf/Nuclear-indicate)	Tons	Bbl		Tons	Bbl	Tons
38	Quantity (Units) of Fuel Burned	9963362	22424	0	2943843	3935	0
39	Avg Heat Cont - Fuel Burned (btu/indicate if nuclear)	8814	135976	0	9059	137000	0
40	Avg Cost of Fuel/unit, as Delvd f.o.b. during year	35.659	113.496	0.000	38.245	128.658	0.000
41	Average Cost of Fuel per Unit Burned	35.195	100.017	0.000	39.017	130.259	0.000
42	Average Cost of Fuel Burned per Million BTU	1.997	17.513	0.000	2.153	22.638	0.000
43	Average Cost of Fuel Burned per KWh Net Gen	0.020	0.000	0.000	0.023	0.000	0.000
44	Average BTU per KWh Net Generation	10162.000	0.000	0.000	10503.000	0.000	0.000

Exh. C

Name of Respondent	This Report Is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
UNION ELECTRIC COMPANY	(1) [X] An Original (2) [ ] A Resubmission	/ /	End of 2013/Q4

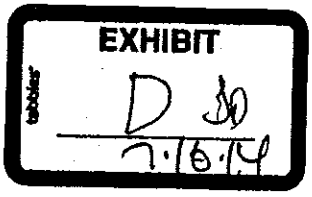
STEAM-ELECTRIC GENERATING PLANT STATISTICS (Large Plants)*(Continued)*

9. Items under Cost of Plant are based on U. S. of A. Accounts. Production expenses do not include Purchased Power, System Control and Load Dispatching, and Other Expenses Classified as Other Power Supply Expenses. 10. For IC and GT plants, report Operating Expenses, Account Nos. 547 and 549 on Line 25 "Electric Expenses," and Maintenance Account Nos. 553 and 554 on Line 32, "Maintenance of Electric Plant." Indicate plants designed for peak load service. Designate automatically operated plants. 11. For a plant equipped with combinations of fossil fuel steam, nuclear steam, hydro, internal combustion or gas-turbine equipment, report each as a separate plant. However, if a gas-turbine unit functions in a combined cycle operation with a conventional steam unit, include the gas-turbine with the steam plant. 12. If a nuclear power generating plant, briefly explain by footnote (a) accounting method for cost of power generated including any excess costs attributed to research and development; (b) types of cost units used for the various components of fuel cost; and (c) any other informative data concerning plant type fuel used, fuel enrichment type and quantity for the report period and other physical and operating characteristics of plant.

Plant Name: *Rush Island* (d)	Plant Name: *Meramec* (e)	Plant Name: *Peno Creek C.T.* (f)	Line No.
Steam	Steam	Combustion Turbine	1
Conventional	Semi-Outdoor Boiler	Outdoor	2
1976	1953	2002	3
1977	1961	2002	4
1242.00	923.00	242.00	5
1235	853	241	6
8760	6679	400	7
1209	859	208	8
1224	873	232	9
1182	833	188	10
170	191	0	11
8475304000	2479289000	39033000	12
951577	272391	1600578	13
67733298	50182874	2065062	14
628351444	671746481	104928726	15
5940606	9316885	0	16
702976925	731518631	108594366	17
566.0040	792.5446	448.7370	18
1653650	1589989	158420	19
175875319	64344822	3878790	20
0	0	0	21
3848800	7140585	0	22
0	0	0	23
0	0	0	24
1806715	0	313448	25
2509014	3116146	253104	26
0	0	0	27
0	0	0	28
2503701	3332730	13649	29
1529041	1159732	71400	30
8011161	8874450	0	31
1093388	2428122	1508698	32
2893890	2606793	23134	33
201724679	94593369	6220643	34
0.0238	0.0382	0.1594	35

Coal	Oil		Coal	Gas		Gas	Oil		
Tons	Bbl		Tons	Mcf		Mcf	Bbl		
4906573	11643	0	1626491	196065	0	448849	0	0	38
8664	136007	0	8785	1025	0	1028	0	0	39
36.647	107.591	0.000	38.720	4.098	0.000	8.708	0.000	0.000	40
35.586	97.513	0.000	39.036	4.098	0.000	8.708	0.000	0.000	41
2.054	17.071	0.000	2.222	3.997	0.000	8.475	0.000	0.000	42
0.021	0.000	0.000	0.026	0.000	0.000	0.099	0.000	0.000	43
10040.000	0.000	0.000	11608.000	0.000	0.000	11816.000	0.000	0.000	44

Exh. C



STATE OF MISSOURI
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held at its office in Jefferson City on the 13th day of November, 2013.

In the Matter of Ameren Missouri's Application for Authorization to Suspend Payment of Solar Rebates	)))	**File No. ET-2014-0085** Tariff No. YE-2014-0173

ORDER APPROVING STIPULATION AND AGREEMENT

Issue Date: November 13, 2013 Effective Date: November 23, 2013

On November 8, 2013, Union Electric Company d/b/a Ameren Missouri, the Staff of the Commission, the Office of the Public Counsel, Missouri Division of Energy, Missouri Solar Energy Industries Association (MOSEIA), Brightergy, LLC, Earth Island Institute d/b/a Renew Missouri, and the Missouri Industrial Energy Consumers (MIEC) filed a stipulation and agreement to resolve all issues connected with Ameren Missouri's application for authority to suspend payment of solar rebates. One party - Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company - did not join in the stipulation and agreement, but has indicated it will not oppose the stipulation and agreement. Pursuant to Commission Rule 4 CSR 240.2.115(2), the Commission will treat the stipulation and agreement as unanimous.

The Commission conducted an on-the-record proceeding regarding the stipulation and agreement on November 12, 2013. At that proceeding, the Commission questioned the parties about the terms of the stipulation and agreement.

The signatories agree on a specified aggregate level of solar rebate payments that Ameren Missouri must reach before it is allowed to suspend such payments. Upon

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Ameren Missouri's	)	
Application for Authorization to Suspend	)	File No. ET-2014-0085
Payment of Certain Solar Rebates.	)	Tariff No. YE-2014-0173

NON-UNANIMOUS STIPULATION AND AGREEMENT

COME NOW *Union Electric Company d/b/a* Ameren Missouri ("Ameren Missouri"), the Staff of the Missouri Public Service Commission ("Staff"), Office of the Public Counsel, Missouri Division of Energy ("MDOE"), Missouri Solar Energy Industries Association ("MOSEIA")[1], Brightergy, LLC ("Brightergy"), Earth Island Institute d/b/a Renew Missouri ("Renew Missouri")[2] and the Missouri Industrial Energy Consumers ("MIEC")[3] (collectively the "Signatories")[4] and for their Non-Unanimous Stipulation and Agreement ("Agreement"), respectfully state as follows:

I. BACKGROUND OF PROCEEDING

1. On November 4, 2008, Proposition C was adopted by the voters of Missouri and later codified as Section 393.1030 RSMo. (Cum. Supp. 2011) which mandated, *inter alia*, that the "commission shall, in consultation with the department, prescribe by rule a portfolio requirement for all electric utilities to generate or purchase electricity generated from renewable energy resources. . .. "

[1] MOSEIA is executing this agreement on behalf of itself and in a representative capacity on behalf of its members.
[2] Renew Missouri is executing this agreement on behalf of itself and in a representative capacity on behalf of its members.
[3] MIEC is executing this agreement on behalf of itself and in a representative capacity on behalf of its members.
[4] Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company (collectively "KCP&L"), who are parties to this case, are not Signatories to this Agreement but have indicated that they do not object to it.

Exh. D

differences to be used as an adjustment to the RES compliance budget for subsequent RRI calculations. This provision will remain in effect until the recovery of rebate costs is complete or until the RES rules are revised to include a carryover provision. An illustration of the operation of this carryover provision is attached hereto as Exhibit A. If the cumulative differences from all prior years are negative (i.e., reflect a cumulative "underspend"), and if Ameren Missouri can meet the RES portfolio requirements without exceeding the 1% retail rate impact limitation, then Ameren Missouri will not incur excess RES compliance costs in order to offset the prior underspend. To the extent the foregoing provision requires a waiver from existing Rule 4 CSR 240-20.100(5)(B) or (5)(D), the Signatories agree that good cause exists to grant Ameren Missouri such a waiver.

h. When adjusting downward the proportion of renewable energy resources pursuant to rule 4 CSR 240-20.100(5)(D), Ameren Missouri agrees to give first priority to reducing or eliminating the amount of renewable energy credits ("RECs")[8] unassociated with electricity delivered to Missouri customers. Furthermore, in support of the immediately preceding sentence, Ameren Missouri agrees to cooperate in implementing a rule establishing priority for reduction or elimination of RECs and SRECs unassociated with electricity delivered to Missouri customers when a utility has reached the 1% retail rate limit

[8] RECs associated with solar energy are referred to as "SRECs".

Exh. D

and must adjust downward their renewable energy resources pursuant to 4 CSR 240-20.100(5)(D), and in place of such RECs or SRECs establishes a preference for utility-owned renewable energy resources, followed by RECs or SRECs associated with electricity delivered to Missouri customers, followed by RECS or SRECs not associated with electricity delivered to Missouri customers. Also in support of the first sentence of this subparagraph h, Ameren Missouri agrees, where it is prudent to do so, to make a good-faith effort to utilize only RECs or SRECs associated with electricity delivered to Missouri customers when it retires RECs or SRECs. Renew Missouri agrees to dismiss with prejudice Counts I and II of Renew Missouri's Complaints in Case Nos. EC-2013-0377 and EC-2013-0378 and, with respect to Count III of the Complaint in Case No. EC-2013-0377, Renew Missouri agrees that it will not appeal any Commission order adverse to Renew Missouri on Count III in Case No. EC-2013-0377.

III. GENERAL PROVISIONS OF AGREEMENT

8. This Agreement is being entered into solely for the purpose of settling the issues in this case explicitly set forth above. Unless otherwise explicitly provided herein, none of the Signatories to this Agreement shall be deemed to have approved or acquiesced in any ratemaking or procedural principle, including, without limitation, any cost of service methodology or determination, depreciation principle or method, method of cost determination or cost allocation or revenue-related methodology. Except as explicitly provided herein, none of the Signatories shall be prejudiced or

Exh. D

EO-2014-0291

EXHIBIT
ES
7-10-14

Ameren Missouri

Renewable Energy Standard Compliance Plan 2014-2016

Prepared in Compliance with 4 CSR 240-20.100

April 15, 2014

Ameren MISSOURI

NP

The following table details the renewables percentage requirements of the retail electric sales for the non-solar and solar RES:

Time Period	Non-Solar	Solar*
2011-2013	2%	2%
2014-2017	5%	2%
2018-2020	10%	2%
2021-forward	15%	2%

*(Solar percentages are applied to the non-solar RES amounts)

As referenced above, the DNR is responsible for determining all eligible renewable resources that can be utilized by the IOUs in meeting the requirements of the RES. DNR rule 10 CSR 140-8.010 (2), contains the list of all eligible renewable resources which qualify to meet the compliance with the RES.

Ameren Missouri's compliance with the RES, as demonstrated in this report, includes only those renewable resources as currently defined by the above referenced rule.

In addition, the RES rules allow for the banking of RECs for up to a three year time period. This will allow for the use of eligible RECs generated from January 1, 2010 to the current time period in meeting the RES requirements for calendar year 2013.

Any generation and/or RECs from a Missouri renewable resource are entitled to a factor of 1.25 applied to each MWh.

The following information in this report will demonstrate the specific means through which Ameren Missouri intends to meet its obligations under both the non-solar and solar RES for the calendar years 2014-2016. A part of each section will address the necessary information required for each individual year.

Exh. E

Table 2

Forecasted Retail Electric Sales
And RES Requirements

Ameren Missouri
Projected Retail Electric Sales
Missouri Renewable Energy Standard

Year	Customer Forecast (MWH) Total Load	Renewable Requirement (%)	Renewable Requirement (MWH)	Solar Requirement (%)	Non-Solar Renewables Requirement
2014	36,852,292	5	1,842,615	36,852	1,805,762
2015	36,829,018	5	1,841,451	36,829	1,804,622
2016	36,900,994	5	1,845,050	36,901	1,808,149

Exh. E