

Exhibit No.: _____

Issue: Thermal Resources

Witness: David A. Schlissel

Type of Exhibit: Rebuttal testimony

Sponsoring Party: NRDC et al.

Case No. EO-2011-0271

Date testimony prepared: October 28, 2011

**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI**

In re: Union Electric Company's)	
2011 Utility Resource Filing pursuant)	Case No. EO-2011-0271
To 4 CSR 240 – Chapter 22.)	

**REBUTTAL TESTIMONY OF
DAVID A. SCHLISSEL**

ON BEHALF OF

**NRDC, SIERRA CLUB, RENEW MISSOURI
MID-MISSOURI PEACEWORKS, AND
GREAT RIVERS ENVIRONMENTAL LAW CENTER**

OCTOBER 28, 2011

PUBLIC – CONFIDENTIAL MATERIALS HAVE BEEN REDACTED

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File No. EO-2011-0271

County of Middlesex)
Commonwealth of Massachusetts)

AFFIDAVIT OF DAVID A. SCHLISSEL

David A. Schlissel of lawful age, on his oath states: that he has participated in the preparation of the following rebuttal testimony in question and answer form, consisting of 11 pages to be presented in the above case; that the answers in the following rebuttal testimony were given by him; that he has knowledge of the matters set forth in such answers; and that such answers are true to the best of his knowledge and belief.

David A. Schlissel
David A. Schlissel

On this 28th day of October 2011, before me, the undersigned notary public, personally appeared DAVID A. SCHLISSEL, proved to me through satisfactory evidence of identification, which were MASS DRIVERS LICENSE, to be the person whose name is signed on the preceding or attached document and acknowledged to me that he signed it voluntarily for its stated purpose.

Ramon Marrero
Notary Public

My commission expires:

RAMON MARRERO
NOTARY PUBLIC
My commission expires Dec. 5, 2014



1 **Q. Please state your name, occupation, and business address.**

2 A. My name is David A. Schlissel. I am the President of Schlissel Technical Consulting, Inc.
3 My business address is 45 Horace Road, Belmont, Massachusetts 02478.

4 **Q. On whose behalf are you testifying in this proceeding?**

5 A. I am testifying on behalf of NRDC, the Sierra Club, Renew Missouri, Mid-Missouri
6 Peaceworks, and Great Rivers Environmental Law Center.

7 **Q. Please summarize your educational background and recent work experience.**

8 A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of
9 Science Degree in Engineering. In 1969, I received a Master of Science Degree in
10 Engineering from Stanford University. In 1973, I received a Law Degree from Stanford
11 University. In addition, I studied nuclear engineering at the Massachusetts Institute of
12 Technology during the years 1983-1986.

13 Since 1983 I have been retained by governmental bodies, publicly-owned utilities, and
14 private organizations in 38 states to prepare expert testimony and analyses on engineering
15 and economic issues related to electric utilities. My recent clients have included the U.S.
16 Department of Justice, the Attorney General and the Governor of the State of New York,
17 state consumer advocates, and national and local environmental organizations.

18 I have filed expert testimony before state regulatory commissions in Arizona, New
19 Jersey, California, Connecticut, Kansas, Texas, New Mexico, New York, Vermont, North
20 Carolina, South Carolina, Maine, Illinois, Indiana, Ohio, Massachusetts, Missouri, Rhode
21 Island, Wisconsin, Iowa, South Dakota, Georgia, Minnesota, Michigan, Florida, North
22 Dakota, Mississippi, Maryland, Virginia, Arkansas, Louisiana, Colorado, New Mexico,
23 Oregon and West Virginia and before an Atomic Safety & Licensing Board of the U.S.
24 Nuclear Regulatory Commission.

25 A copy of my current resume is included as Exhibit DAS-1. Additional information
26 about my work is available at www.schlissel-technical.com.

1 **Q. Have you previously testified before this Commission?**

2 A. Yes. I have testified in Commission Cases Nos. ER-85-128 and EO-85-185.

3 **Q. Please summarize your Reply Testimony.**

4 A. Schlissel Technical Consulting was retained to investigate the reasonableness of Ameren
5 Missouri's ("Ameren" or "the Company") 2011 Integrated Resource Plan ("IRP") filing.
6 This Reply Testimony responds to certain points made in Ameren's *Response to*
7 *Comments of Parties*.

8 **Q. What information did you review as part of your analysis?**

9 A. I reviewed Ameren's 2011 IRP and supporting workpapers. I also reviewed the
10 Company's responses to the data requests submitted by my clients and other parties.

11 As part of my review, I also examined the output data and files from Ameren's computer
12 modeling.

13 **Q. The Company has stated that it plans to monitor changes in natural gas prices and**
14 **to include an update of its natural gas price assumptions in its 2012 IRP Annual**
15 **Update.¹ Is that response adequate?**

16 A. No. The extremely high natural gas prices used by Ameren in its 2011 IRP analyses by
17 itself unreasonably distort all of the Company's resource evaluations and heavily bias
18 those evaluations in favor of continued operation of its coal-fired generating units.²
19 Consequently, the 2011 IRP does not represent a reasonable or valid resource planning
20 analysis, and the results of the 2011 IRP should not be used to justify or support, in any
21 way, any major investments in the Meramec, Rush Island, Labadie or Sioux plants before
22 the Company presents further analyses, based on more recent and more reasonable
23 natural gas price forecasts, that would justify each such expenditure. For example,
24 Ameren should not be allowed to seek rate recovery for the more than \$160 million of

¹ Ameren's *Response to Comments of Parties*, Natural Gas Prices Issue 1, at Appendix A, page 69.

² See pages 32-34 of the *Comments of NRDC, Sierra Club, Renew Missouri, Mid-Missouri Peaceworks, and Great Rivers Environmental Law Center*.

1 capital expenditures at Meramec that are indicated in Figure 3.3 on page 47 of Exhibit A
2 to the Company's *Response to Comments of Parties* until such time as a reasonable and
3 valid resource evaluation is completed

4 **Q. Do you have any comment on Ameren's claim that it is reasonable to use Meramec**
5 **as a test case on which it can base decisions about the economic prudence of making**
6 **expensive investments at its other coal-fired generating plants?**³

7 A. Yes. This claim is wholly unreasonable. Each power plant unit has unit-specific costs,
8 operating circumstances, and other factors that must be considered in an economic
9 analysis of retirement versus retrofit of that unit.

10 More particularly, while Ameren contends that it would not need to install a scrubber on
11 Meramec under the company's "moderate" environmental scenario, the Company has
12 acknowledged in its 2011 IRP that even under its "moderate" scenario, a scrubber would
13 need to be installed on Rush Island Units 1 and 2 in 2016, at Labadie Units 1 and 2 in
14 2020, and Labadie Units 3 and 4 in 2024.⁴ The scrubber at Rush Island is currently
15 estimated to cost \$620 million and to cause a 23 MW reduction in plant output, while the
16 scrubbers would cost \$1.1 billion at Labadie and cause a 46 MW reduction in plant
17 output.⁵ Given that Rush Island and Labadie face far higher costs under either a
18 "moderate" or an "aggressive" environmental scenario than Meramec would under the
19 "moderate" scenario relied on by Ameren, the fact that Ameren has concluded that
20 Meramec would not retire under the Company's preferred resource plan does not support
21 any contention that Rush Island or Labadie should not be retired.

³ See, for example, Ameren's *Response to Comments of Parties*, at pages 42 and 43.

⁴ Ameren 2011 IRP, at Chapter 8, page 20.

⁵ Id., at Chapter 8, page 23.

1 **Q. But doesn't Figure 3.2 in Ameren's *Response to Comments of Parties* show that the**
2 **Labadie and Rush Island coal plants have lower average production costs than**
3 **Meramec?**

4 A. It is important to emphasize that the data in Figure 3.2 in Ameren's *Response to*
5 *Comments of Parties* includes only fuel and O&M costs. The data does not reflect the
6 significantly higher capital and environmental control costs that those units face.
7 Therefore, Figure 3.2 does not provide any persuasive evidence that based on Ameren's
8 Meramec analyses, the units at Rush Island and Labadie should be retrofitted instead of
9 retired.

10 **Q. Has Ameren provided any evidence justifying an operating life for the Meramec**
11 **Units that would be far longer than the expected operating lives identified by Black**
12 **& Veatch and Burns & McDonnell?**

13 A. No. As we explained in our initial *Comments*, Ameren unreasonably selected a preferred
14 resource plan that assumes that the Meramec units would continue operating until 2042,
15 at which time they would be 81 to 89 years old. Such ages are far longer than the 65 year
16 life identified by Black & Veatch's *Life Expectancy Report* and are highly inconsistent
17 with the discussion of expected life in Burns & McDonnell's *Meramec Condition*
18 *Assessment Study*.

19 Indeed, Ameren simply offers a non-response on this issue. With regards to the Black &
20 Veatch *Life Expectancy Report*, Ameren states that such "analysis is perfectly valid and
21 useful for assessing plant life expectancy," but that "it is not necessarily the final word on
22 the matter."⁶ Ameren then notes that the Burns & McDonnell study evaluated the
23 economics of trying to keep the Meramec units operating into their eighties.⁷ But, as
24 Ameren acknowledges, the Burns & McDonnell study did not evaluate whether it is
25 technically feasible to operate the Meramec units that long. Instead, the "study simply

⁶ Ameren's *Response to Comments of Parties*, at page 45.

⁷ Id.

1 [HC] evaluated the question of how much would Ameren Missouri have to spend and
2 invest” if the economics suggested continued operation.⁸

3 In short, the only technical evaluation of the life expectancy of the Meramec units that
4 Ameren has provided identified a retirement age that is 16 to 24 years before the age that
5 Ameren has assumed in its IRP, and Ameren has identified no evidence supporting its
6 decision to ignore that analysis. Plainly, an IRP that assumes the continued operation of
7 coal units well past the time when they might otherwise be expected to retire cannot be
8 considered reasonable.

9 **Q. What actual operating experience is there for coal plants operating into their**
10 **eighties?**

11 A. There is only an extremely limited actual operating experience for coal-fired units in the
12 U.S. operating for more than 60 years. For example,

13 **Highly Confidential**

14
15
16
17 Consequently, there is no actual operating experience to support the following key
18 assumptions underlying the results of Ameren’s IRP analyses:

- 19 • That the Meramec units actually will continue to operate efficiently and
20 economically until 2042.
- 21 • That the costs of operating the Meramec units will not increase dramatically as
22 they age.
- 23 • That the operating performance of the Meramec units will not degrade
24 significantly as they age.

25 In fact, Detroit Edison has recently stated in testimony submitted to the Michigan Public
26 Service Commission that it is currently assuming, for planning purposes, that it will retire
27 the 62 year old Trenton Channel coal-fired plant in 2015.⁹

⁸ Id., at pages 45 and 46.

1 [HC] At most, Ameren has a set of projections about the future operating costs and
2 performance of the Meramec units that are inconsistent with the only technical analyses
3 that the company presented. But that is all they are, projections, not guarantees, about
4 plant operating performance and costs for the next 30 years. Given the high levels of
5 uncertainty as to how well the units at Meramec and Ameren's other coal plants will
6 operate during this three decade period and what their annual O&M and capital
7 expenditures will be, the Company should consider ranges of future operating
8 performances (e.g., lower equivalent availabilities, higher heat rates, lower capacity
9 factors) and future O&M costs and annual capital expenditures in its coal plant retrofit
10 versus retire analyses.

11 **Q. Ameren claims that its IRP analyses show that the Meramec units will achieve**
12 **capacity factors of 70 percent during the planning period.¹⁰ Is this a correct**
13 **representation of the results of Ameren's modeling analyses?**

14 A. Not entirely. As shown in Figures 3 and 4 on pages 29 and 30 of our *Comments*,
15 Ameren's modeling analyses assume that Meramec Units 1, 2 and 4 would achieve
16 capacity factors between the ****Highly Confidential**** in every year between 2016
17 and 2039.

18 **Q. Has Ameren provided any evidence that the Meramec units can be expected to**
19 **achieve annual capacity factors of between the ****Highly Confidential******

20 ?

21 A. No. The Company has provided no evidence to support such an assumption. In fact, the
22 Burns & McDonnell *Meramec Condition Assessment Study* assumes that the units will
23 operate at only a 30 percent capacity factor after 2021 or 2025.¹¹ As I have noted above,

⁹ In re Application of Detroit Edison Company for Authority to Implement a Power Supply Cost Recovery Plan In Its Rate Schedule for 2012 Metered Jurisdictional Sales of Electricity, MPSC Case No. U-16892, Testimony of Angela P. Wojtowicz at p. 27 lines 4-8, dated September 30, 2011.

¹⁰ *Response to Comments of Parties, Exhibit A*, at page 48.

¹¹ At page 5-1.

1 there is no actual coal plant operating experience beyond age 62 for coal units that are
2 100 MW or larger.

3 **Q. Do you have any comment on Ameren’s claim that NRDC asserts that because the**
4 **Burns & McDonnell study assumed capacity factors of 30 percent beyond 2025 and**
5 **the IRP analysis shows capacity factors of 70 percent that the capital expenditure**
6 **and O&M forecasts assumed in the IRP are “understated?”**

7 A. Yes. Ameren misrepresents our point. We are not saying that the capital expenditure and
8 O&M forecasts assumed in the IRP are understated because of the higher capacity factors
9 in the IRP analyses. We are making two entirely different, but very important, points.
10 First, given the lack of actual operating experience with aging coal-fired power plants,
11 future O&M and capital expenditures at Meramec and Ameren’s other coal units may be
12 significantly higher than the Company now assumes. Second, the higher capacity factors
13 that Ameren assumes in its IRP can be achieved at Meramec make it appear more
14 beneficial to keep the units operating than may reasonably be the case. More particularly,
15 the economics of continuing to run Meramec will be very different if, in fact, the future
16 operations of the Meramec units reflect the 30 percent capacity factors assumed by Burns
17 & McDonnell rather than the much higher capacity factors that Ameren assumes in its
18 IRP analyses can be achieved. For these reasons, Ameren should have examined
19 scenarios with ranges of future Meramec unit operating performance and O&M and
20 capital additions expenditures.

21 **Q. Does Ameren’s discussion in its *Response to Comments of Parties* of the recent**
22 **operating costs and operating performance of its coal plants provide persuasive**
23 **evidence that the plants’ operating costs will not increase significantly as they age or**
24 **that their operating performance will not degrade dramatically?**

25 A. No. Figures 3.4 through 3.8 in Ameren’s *Response to Comments of Parties* only show
26 the actual plant O&M and equivalent availabilities for each of Ameren’s coal-fired plants
27 since 1990. They do not present any evidence that the units won’t experience

1 significantly higher costs, significantly degraded operating performance or serious
2 unpleasant surprises as they age.

3 **Q. Do you have any comment on the annual plant O&M figures shown in Figure 3.4 on**
4 **page 49 of Exhibit A to Ameren's *Response to Comments of Parties*?**

5 A. Yes. The annual O&M costs are presented in constant 2010 dollars. Therefore, the effects
6 of inflation have been excluded. Consequently, what appear to be level annual plant
7 O&M costs actually were rising over time in nominal, 'as-is' year dollars. Similarly, the
8 decline in Labadie's annual plant O&M was nowhere as steep in nominal, 'as-is' year
9 dollars as Figure 3.4 would suggest.

10 **Q. Does Ameren provide any evidence in its *Response to Comments of Parties* that it has**
11 **adequately considered the potential to convert its existing CTGs to combined cycle**
12 **units or to purchase capacity and energy from existing, and underutilized, combined**
13 **cycle facilities?**

14 A. No. The Company has not provided any evidence in its *Response to Comments of Parties*
15 that it has considered the technical or economic feasibility of converting any or all of the
16 CTGs at its Audrain, Goose Creek, Pinckneyville or Kimmundy sites to natural gas-fired
17 combined cycle units. Nor has the Company provided any evidence that it has considered
18 the technical or economic feasibility of purchasing unused capacity and energy from
19 existing natural gas-fired generating facilities.

20 **Q. Does Ameren provide any evidence to support its supposition that existing gas-fired**
21 **power plants "most likely" are already fully utilized during times of peak**
22 **demand?¹²**

23 A. No. Ameren has provided no evidence to support this claim even though this is certainly
24 a factor that Ameren should investigate as part of its IRP analyses.

¹² *Response to Comments of Parties, Appendix A, at page 71.*

1 **Q. What benefits would converting existing CTGs to combined cycle units provide for**
2 **Ameren's system?**

3 A. Converting existing CTGs to combined cycle units (1) could create additional capacity
4 that would offset any capacity loss from the retirement of one or more of the Company's
5 existing coal-fired units and (2) would make more efficient use of natural gas by
6 significantly reducing the unit's heat rate. And with a significantly lower heat rate
7 (approximately 7,000 btu/KWh in a combined cycle plant) the Company could generate
8 more energy in a combined cycle unit while still using the same amount of natural gas as
9 might otherwise be burned in a CTG.

10 **Q. Do you have any comment on Ameren's claim that the OPC report co-authored by**
11 **Synapse Energy Economics concluded that the CO₂ prices used by Ameren are**
12 **within the band considered reasonable?**¹³

13 A. Yes. As shown in Figure 6 on page 45 of our *Comments*, the single set of CO₂ prices
14 used by Ameren in its IRP analyses is lower than even the Synapse Low Forecast.
15 Moreover, even if it were correct that the single set of CO₂ prices used by Ameren were
16 barely above the Synapse Low Forecast and, consequently, was within the band between
17 the Synapse Low and the Synapse High Forecasts, that would not make it reasonable for
18 the Company to have used only a single set of CO₂ prices. As we noted in our
19 *Comments*, it is not appropriate to examine only a single set of CO₂ prices in resource
20 planning analyses given the uncertainties surrounding the timing, stringency and design
21 of any federal regulatory regime for greenhouse gas emissions. Instead, the Company
22 should examine a wide range of CO₂ prices in its IRP to allow for these uncertainties.

23 **Q. Do you have any comment on the nuclear construction cost estimates from AEO**
24 **2010 and AEO 2011 that Ameren cites in its *Response to Comments of Parties*?**

25 A. The AEO 2010 and AEO 2011 nuclear construction cost estimates suffer from the same
26 lack of actual domestic nuclear construction experience as Ameren's own estimates.

¹³ Id., at page 57.

1 Consequently, there is no evidence that actual nuclear construction costs will fall within
2 the range that the EIA now estimates. In fact, as explained in our *Comments*, given the
3 nuclear industry's demonstrated failure to accurately project the actual construction costs
4 of many of the existing generation of nuclear units, it is more reasonable to expect that
5 actual nuclear plant construction costs will be above (and perhaps significantly above) the
6 EIA's current estimates.

7 **Q. Do you have any comment on the probability figures that Ameren assigns to its**
8 **range of estimated nuclear construction costs?**

9 A. Yes. The probability ranges and statistical analysis that Ameren applies to its estimated
10 nuclear construction costs are essentially based on speculation. There is no actual
11 experience building new nuclear power plants in the U.S. in the past decade and there is
12 absolutely no actual experience in building in the U.S. the new nuclear design that
13 Ameren says it anticipates using. Thus, no one knows what it will cost to build a new
14 nuclear power plant with a new design in the U.S. and how long the construction will
15 take. The probability figures that Ameren uses sound nice and reassuring but convey a
16 false sense of security. I don't see where there is any foundation for relying on them.

17 For example, Ameren assigns a probability of 20 percent to its low nuclear cost estimate,
18 60 percent to its base cost estimate and 20 percent to its high estimate. However, given
19 the industry's past failures to even come close to estimating what actual nuclear
20 construction costs would be, these figures could easily be 0 percent for the low estimate,
21 25 percent for the base estimate, 25 percent for the high estimate and 50 percent as the
22 probability that the actual overnight construction cost will be above \$8 billion. It is
23 critical to emphasize that no one knows what it will cost to build a new nuclear plant, but
24 past experience strongly suggests that the price will be significantly higher than is
25 currently being estimated – this will be especially true for the first wave of new plants
26 that will be built in the U.S. using each of the new reactor designs.

1 **Q. Do you have the same concern regarding the probabilities that Ameren assigns to**
2 **the scenarios in the branches of the Final Probability Tree shown on page 5 of**
3 **Chapter 2 to its 2011 IRP filing?**

4 A. Yes. The various probabilities that Ameren assigns to the different futures that are
5 represented by the branches of its Final Probability Tree also are essentially based on
6 speculation. These probabilities may appear reassuring but, in fact, they give a false
7 sense of precision, certainty and security. For example, no one really can say that there is
8 only a 33 percent probability that a CO₂ price will be applied to CO₂ emissions through
9 enactment of a carbon tax or a cap-and-trade regime at any point in the next 30 years. Or
10 that there is a 57 percent probability that “Energy Bill Mandates” will be adopted without
11 any prices being applied to CO₂ emissions. Contrary to Ameren’s modeling, adoption of
12 legislative Energy Bill Mandates for a federal renewable energy portfolio and/or energy
13 efficiency standards/efforts is not at all inconsistent with enactment of a carbon tax or a
14 cap-and-trade regime that would set prices for CO₂ emissions. Indeed, they are often
15 considered as complementary actions.

16 **Q. Does this complete your testimony?**

17 A. Yes.