

**ILLINOIS COMMERCE COMMISSION**

**DOCKET Nos. 09-0306 - 09-0311 (cons.)**

**REVISED**

**SURREBUTTAL TESTIMONY**

**OF**

**DAVID W. SOSA, Ph.D.**

**SUBMITTED ON BEHALF**

**OF**

**CENTRAL ILLINOIS LIGHT COMPANY  
d/b/a AmerenCILCO**

**CENTRAL ILLINOIS PUBLIC SERVICE COMPANY  
d/b/a AmerenCIPS**

**ILLINOIS POWER COMPANY  
d/b/a AmerenIP**

**(The Ameren Illinois Utilities)**

**December 8, 2009**

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8

9   **I.     INTRODUCTION**

10 **Q.    Please state your name and business address.**

11 A.    My name is David W. Sosa, Ph.D. My business address is Analysis Group, 650  
12 California Street, 23<sup>rd</sup> Floor, San Francisco, CA 94108.

13 **Q.    Are you the same Dr. David W. Sosa who previously provided rebuttal**  
14 **testimony in this matter?**

15 A.    Yes, I am.

16 **Q.    On behalf of whom are you sponsoring surrebuttal testimony?**

17 A.    I am sponsoring surrebuttal testimony on behalf of the Ameren Illinois Utilities  
18 (“AIUs”).

19 **II.   PURPOSE OF TESTIMONY**

20 **Q.    What is the purpose of your surrebuttal testimony?**

21 A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of  
22 Citizens Utility Board (“CUB”) and Illinois Office of the Attorney General (“AG”)  
23 (jointly “CUB-AG”) witness Mr. Steven A. Fenrick (CUB-AG Exhibit 3.0).

24 **Q. Dr. Sosa, are you sponsoring any exhibits with your surrebuttal testimony?**

25 A. Yes, I am sponsoring Ameren Exhibits 68.1 - 68.8.

26 **Q. Dr. Sosa, please summarize your previous testimony.**

27 A. The peer group benchmarking approach used by Mr. Amen is a transparent,  
28 reliable and appropriate method to compare the AIUs levels of operation and  
29 maintenance (“O&M”) expense to other utilities’. The results of Mr. Amen’s  
30 benchmarking studies are reasonable and will be helpful to the Commission in evaluating  
31 the AIUs’ expense levels relative to other electric and gas utilities. In contrast, the  
32 econometric benchmarking approach Mr. Fenrick has presented in this proceeding  
33 introduces an unnecessary level of complexity and consequent risk of error to what  
34 should be a transparent and uncomplicated comparison of utility expenses. In fact, Mr.  
35 Fenrick’s analysis suffers from substantial errors that render his results biased, imprecise  
36 and unreliable, and his conclusions regarding the AIUs’ cost efficiency and test year  
37 expenses unreasonable. Correcting some of the serious errors in Mr. Fenrick’s  
38 econometric benchmarking model leads to material changes in his results that are  
39 qualitatively similar to the results of AIUs’ witness Mr. Amen’s benchmarking studies.  
40 Moreover, the examples of econometric benchmarking, as well as the academic literature,  
41 that Mr. Fenrick cites in his testimony do not support either the model he has presented or  
42 his interpretation of the results.

43

44 **III. SUMMARY OF CONCLUSIONS**

45 **Q. Dr. Sosa, please summarize your surrebuttal testimony in response to Mr.**  
46 **Fenrick's comments.**

47 A. My conclusions are:

- 48 • Mr. Fenrick mischaracterizes my critique of his study.
- 49 • Mr. Fenrick presents a false choice between complexity and accuracy. Moreover,  
50 contrary to Mr. Fenrick's assertions, his study is not accurate and his results are  
51 not robust. My careful examination of Mr. Fenrick's study shows that it is biased  
52 and unreliable. As such, Mr. Fenrick's identification of supposed "inefficiencies"  
53 is without merit.
- 54 • Mr. Fenrick fails to address the specification errors in his study.
  - 55 ○ Mr. Fenrick does not rebut my criticism of his failure to control for the  
56 effects of divestiture.
  - 57 ○ Mr. Fenrick apparently concedes that his A&G model is flawed because it  
58 fails to include total generation. However, the alternative model he  
59 presents in his rebuttal testimony still suffers from substantial  
60 specification errors including a failure to control for divestiture and the  
61 inclusion of biased and irrelevant variables.
  - 62 ○ Mr. Fenrick's rebuttal testimony fails to present any evidence that his  
63 wage level variables are reasonable measures of labor costs. Contrary to  
64 Mr. Fenrick's assertions, his wage level variables are biased. They also are  
65 inconsistent with previous studies that he claims to rely on.

- 66           ○ Mr. Fenrick’s rebuttal testimony fails to present any evidence that his  
67           percentage undergrounding variable is a reasonable measure of the extent  
68           to which utilities’ distribution circuits are undergrounded. Contrary to Mr.  
69           Fenrick’s assertions, his percentage undergrounding variable is biased. It  
70           also is inconsistent with previous studies that he claims to rely on.
- 71           ○ Mr. Fenrick’s rebuttal testimony fails to present any evidence that his  
72           percent forested variable is a reasonable measure of utilities’ vegetation  
73           management costs. Contrary to Mr. Fenrick’s assertions, his percent  
74           forested variable is biased. It also is inconsistent with previous studies that  
75           he claims to rely on.
- 76           ● The flaws of Mr. Fenrick’s study notwithstanding, his study does not support his  
77           conclusions.
- 78           ○ In his direct testimony, Mr. Fenrick did not present the statistical  
79           properties that would describe the precision of his benchmark estimates.  
80           These “confidence intervals” indicate the uncertainty associated with his  
81           benchmark estimates.
- 82           ○ In his rebuttal testimony Mr. Fenrick has failed to correctly calculate the  
83           confidence intervals around his benchmark estimates. He has overstated  
84           the precision of his study.
- 85           ○ When the confidence intervals are calculated correctly, the results of Mr.  
86           Fenrick’s flawed model suggest that the AIU’s are average cost  
87           performers.

- 88           ○ Mr. Fenrick’s proposal to use a 68 percent significance level to evaluate  
89           his results is inappropriate in the present context. None of the other studies  
90           that he claims as the basis for his experience with econometric  
91           benchmarking use a significance level below 90 percent.
- 92           • Mr. Fenrick’s apparent inability to fully disclose the materials that he relied upon  
93           and that support his study methods is unusual and perplexing.

94   **IV.   MR. FENRICK MISCHARACTERIZES MY CRITIQUE OF HIS STUDY**

95   **Q.    Is Mr. Fenrick’s characterization of your rebuttal testimony reasonable and**  
96   **accurate?**

97   A.    No. Mr. Fenrick describes my primary criticisms of his direct testimony as: “(1)  
98   model specification, (2) cost causation, (3) wage level variable treatment, (4) treatment of  
99   percent underground variable, (5) joint modeling of distribution and customer care  
100   (“D&CC”) expenses, and (6) confidence intervals.” CUB-AG Ex. 3.0, p. 7. Regarding  
101   model specification he asserts:

102           “[Dr. Sosa’s] main complaint regarding model specification appears to be  
103           that total sales were not included in an output variable versus net  
104           generation in the econometrically estimated administrative and general  
105           benchmarking model...” (CUB-AG Ex. 3.0, p. 7)

106   This is a mischaracterization of my rebuttal testimony. In fact, the specification errors in  
107   Mr. Fenrick’s A&G and D&CC models go far beyond the example of a failure to include  
108   total sales in the A&G model. Mr. Fenrick’s models suffer from substantial specification  
109   errors because he has failed to incorporate cost causing factors in a reasonable and  
110   reliable manner, either (1) by omitting relevant variables or (2) by including biased and

111 irrelevant variables that do not capture the cost factors that he claims. I discuss this  
112 further in Section VI, below. For the most part, Mr. Fenrick's rebuttal testimony merely  
113 asserts that the variables he has used are consistent with an accepted theory of cost  
114 causation. Mr. Fenrick's A&G and D&CC models are biased and unreliable because they  
115 are misspecified. Furthermore, the substantial flaws of his study notwithstanding, Mr.  
116 Fenrick's results are too imprecise to support his conclusions.

117 **Q. Does Mr. Fenrick concede that a specification error may cause the results of**  
118 **a cost model to be biased?**

119 A. Yes he does.

120 **V. MR. FENRICK PRESENTS A FALSE CHOICE BETWEEN**  
121 **COMPLEXITY AND ACCURACY**

122 **Q. In his rebuttal testimony, Mr. Fenrick states "...I believe my analysis**  
123 **presents a much more accurate depiction of cost levels." (CUB-AG Ex. 3.0, p. 2) Do**  
124 **you agree with Mr. Fenrick's characterization of his cost model in comparison with**  
125 **Mr. Amen's?**

126 A. No. Although Mr. Fenrick mentions accuracy five times in his rebuttal testimony,<sup>1</sup>  
127 he never defines the term nor does he present any evidence that his study is accurate. In  
128 fact, a study would be accurate if the results were unbiased. Since Mr. Fenrick's  
129 estimates of benchmark expenses for the AIUs are based on a misspecified model and  
130 biased variables, his results are necessarily biased and therefore inaccurate. I note that  
131 another important consideration in evaluating an analytical model is precision. The  
132 results may be accurate, i.e., unbiased, but also imprecise, to the extent there is a great

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<sup>1</sup> See CUB-AG Ex. 3.0, pp. 2-3.

133 deal of uncertainty associated with the point estimates. Mr. Fenrick assumes a level of  
134 precision that is not consistent with the statistical properties of his model.

135 **Q. In his rebuttal testimony, Mr. Fenrick states “...I believe it would be a**  
136 **disservice to the ratepayers of Illinois to keep the analysis as simple as possible,**  
137 **especially to the point of sacrificing accuracy.” (CUB-AG Ex. 3.0, p. 3) How do you**  
138 **respond?**

139 A. Mr. Fenrick presents a false choice between accuracy and parsimony – the  
140 principle that the simplest of competing theories be preferred to more complex  
141 alternatives. Although Mr. Amen’s results are qualitatively different from Mr. Fenrick’s,  
142 we can only make a determination as to which study is more accurate based on a review  
143 of the analytical techniques applied and the data used. There is no rule in statistics or  
144 economics that equates increased analytical complexity with increased accuracy.

145 **VI. MR. FENRICK’S REBUTTAL TESTIMONY FAILS TO ADDRESS THE**  
146 **SPECIFICATION ERRORS IN HIS STUDY**

147 **Q. In his rebuttal testimony Mr. Fenrick labels as “misleading” your testimony**  
148 **regarding the lack of consistency between his study in this proceeding and previous**  
149 **studies that he claims to have relied on. (CUB-AG Ex 3.0. p. 7) What materials have**  
150 **you reviewed that Mr. Fenrick relied on?**

151 A. Mr. Fenrick identified 11 benchmarking studies of electric utility costs that he  
152 claims to have relied upon in the preparation of his study, including the selection of  
153 variables and assumptions.<sup>2</sup> However, Mr. Fenrick did not produce any of these studies

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<sup>2</sup> In the CUB-AG response to AIU-SAF 4.53, Mr. Fenrick indicates that he relied on the studies listed in the CUB-AG responses to AIU-SAF-1.13 in the preparation of his study. In addition to the 11 studies of

154 because “[he] does not have access to the [studies that he relied on.]”<sup>3</sup> Consequently, my  
155 review of the studies Mr. Fenrick claims to have relied upon has been limited to the six  
156 that are publicly available, two of which I was able to locate only after reviewing Mr.  
157 Fenrick’s supplemental response to AIU-SAF-1.13 dated November 20, 2009. All six  
158 studies were performed by his former employer. I have also identified two relevant  
159 econometric cost studies published in academic journals that were not conducted by Mr.  
160 Fenrick’s former employer.

161 I have reviewed these studies and compared the approaches to Mr. Fenrick’s. I  
162 find a considerable divergence between Mr. Fenrick’s approach in this proceeding and  
163 the available literature on cost modeling and econometric benchmarking.

164 **Q. Please explain Ameren Exhibits 68.1 and 68.2.**

165 A. Ameren Exhibit 68.1 summarizes the approach used in the eight cost modeling  
166 and econometric benchmarking studies I have reviewed, including six that Mr. Fenrick  
167 claims to have relied on. Ameren Exhibit 68.2 provides greater detail on the approach  
168 each study used, including descriptions of the variables.

169 I have concluded that Mr. Fenrick’s A&G and D&CC models are inconsistent  
170 with the studies he has relied on. For certain explanatory variables, Mr. Fenrick’s  
171 empirical results are inconsistent with these studies. Moreover, other studies in the  
172 literature employ a wide range of explanatory variables that Mr. Fenrick apparently has  
173 failed to consider. I will refer to Ameren Exhibit 68.1 as I review Mr. Fenrick’s rebuttal  
174 testimony regarding specification errors.

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electric utility costs listed in the CUB-AG responses to AIU-SAF-1.13, Mr. Fenrick also discloses two studies of gas distribution costs, one study of water distribution costs, and one study of “nuclear power generation,” which do not appear relevant.

<sup>3</sup> See CUB-AG supplemental response to AIU-SAF-1.13 (November 20, 2009).

175           **A.     Mr. Fenrick’s A&G model is mis-specified because relevant variables**  
176           **are omitted**

177           **Q.     In your rebuttal testimony, you criticized Mr. Fenrick for failing to include**  
178           **total sales in his A&G model. How does he respond to your criticism?**

179           A.     Mr. Fenrick argues that although total sales could be used in place of net  
180           generation, this would not be a “fair analysis.” (CUB-AG Ex. 3.0, p. 9) He presents the  
181           results of an alternative specification of his A&G model that includes both total sales and  
182           net generation, which he characterizes as a “fair model.”

183           **Q.     What does Mr. Fenrick mean by “fair”?**

184           A.     Mr. Fenrick’s meaning is unclear. Although “fair” is a familiar word and therefore  
185           may have some superficially plausible meaning, “fair” has no meaning in the disciplines  
186           of economics and statistics in the context of evaluating model specification. It is  
187           inappropriate to evaluate alternative model specifications on the undefined criterion  
188           “fair”.

189           **Q.     Is Mr. Fenrick’s alternative A&G model reasonable?**

190           A.     No. The model still suffers from substantial specification errors. It fails to  
191           reasonably control for the effects of generation divestiture and other restructuring events  
192           on the costs of some, but not all, utilities in Mr. Fenrick’s sample, including the AIUs.  
193           Mr. Fenrick’s revised A&G model also includes the flawed wage level and percent  
194           undergrounding variables. I will discuss these concerns in further detail below.

195           **Q.     Has Mr. Fenrick changed his position regarding the AIUs’ A&G expenses?**

196 A. Notwithstanding his testimony, it is unclear whether Mr. Fenrick has changed his  
197 position. He has presented the results of an alternative model in his rebuttal testimony,  
198 which he characterizes as “fair”. He has not explained whether he considers the model  
199 described in his direct testimony as fair or whether he is now abandoning that alternative  
200 specification.

201 **Q. Mr. Fenrick claims that this alternative specification “reveals the robustness**  
202 **of the estimates when fair model specifications are employed.” (CUB-AG Ex 3.0 p.**  
203 **10) Do you agree with this characterization of Mr. Fenrick’s model results?**

204 A. No. A robust estimate would be one that would change little with a change in the  
205 model specification. In fact, as discussed in my rebuttal testimony, when total sales is  
206 included in Mr. Fenrick’s A&G model, in place of net generation, the difference between  
207 actual expenses and the benchmark average falls by 170 percent and the revised model  
208 suggests that the AIU’s are above average cost performers.<sup>4</sup> In addition, under the  
209 alternative model that Mr. Fenrick describes on pages 9 and 10 of his rebuttal testimony  
210 the difference between actual expenses and the benchmark average falls by 40 percent.<sup>5</sup>  
211 Contrary to his assertions, Mr. Fenrick’s results are not robust; they are extremely fragile.

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<sup>4</sup> The difference between the AIUs’ actual average 2005-2007 A&G O&M expenses and Mr. Fenrick’s combined A&G O&M benchmark estimate for the three AIUs (average 2005-2007 predicted expenses as reported in CUB-AG Ex 1.2, Table 4-2) was \$27.0 million. Substituting total sales for net generation yields a difference between actual expenses and the benchmark estimate of negative \$19.4 million (actual expenses are less than the benchmark), a decrease of approximately 170 percent.

<sup>5</sup> For the sensitivity presented by Mr. Fenrick in CUB-AG Ex 3.0, the difference between actual A&G expenses and the benchmark is \$16.8 million, a decrease of approximately 40 percent relative to the estimate of \$27.0 million reported in CUB-AG Ex 1.2, Table 4-2.

212 **B. Mr. Fenrick's models are misspecified because he fails to account for**  
213 **divestiture during the study period**

214 **Q. In your rebuttal testimony, you criticize Mr. Fenrick for failing to account**  
215 **for the effects of divestiture during his study period. Does Mr. Fenrick rebut this**  
216 **point?**

217 A. No. Mr. Fenrick has not responded substantively to my criticism that he fails to  
218 adequately control for the effects of generation divestiture. Mr. Fenrick's study period is  
219 1994-2007. During this period, utilities in several jurisdictions across the country  
220 divested generation assets, including the AIUs. Some utilities divested voluntarily, others  
221 were required to divest. These utilities also generally experienced other restructuring-  
222 related changes in energy markets.

223 **Q. What is structural change and why is it important in the context of a cost**  
224 **model such as Mr. Fenrick's?**

225 A. Structural change is an econometric term that refers to a change, often discrete, in  
226 the fundamental process being modeled. For example, in the case of a cost model, such as  
227 Mr. Fenrick's, structural change would be a fundamental change in the cost causation  
228 process. As I mentioned earlier, during Mr. Fenrick's study period, utilities in several  
229 jurisdictions across the country divested generation assets, including the AIUs. The  
230 reduction or elimination of power generation activities may mean a fundamental change  
231 in the way A&G O&M costs are caused. For example, as a utility divests generation  
232 assets, certain associated overhead expenses associated with own generation may be  
233 eliminated at the same time that other overhead expenses may increase as a result of  
234 increased power procurement activities and changes in risk management practices. The

235 academic literature suggests that an event such as generation divestiture should be taken  
236 into account in a cost model.<sup>6</sup> A reasonable cost model should control for structural  
237 change. As discussed in one of Mr. Fenrick's references, failure to account for structural  
238 change is a specification error.<sup>7</sup>

239 **Q. Is Mr. Fenrick's percent generation in total sales variable a reasonable**  
240 **control for divestiture?**

241 A. No. Mr. Fenrick's percent generation in total sales variable is a continuous  
242 measure of own generation output relative to total sales, in MWh. It is not a reasonable  
243 measure to control for the discrete increases in costs engendered by divestiture, for  
244 example power procurement and risk management costs. The percent generation in total  
245 sales variable also reflects factors unrelated to divestiture, such as major plant outages,  
246 which can account for wide variations in utility net generation. Moreover, in an attempt  
247 to control for divestiture with a measure of own generation is inconsistent with the  
248 academic literature on cost modeling, which indicates how challenging it is to account for  
249 divestiture.<sup>8</sup>

250 **Q. Mr. Fenrick claims that it is appropriate to include his measure of net**  
251 **generation because his sample includes "both vertically integrated utilities and**  
252 **delivery-only utilities." (CUB-AG Ex. 3.0, p. 8) Is this consistent with the studies**  
253 **that he relies on?**

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<sup>6</sup> See John Kwoka, Sanem Ozturk and Michael Pollitt, "Divestiture Policy and Operating Efficiency in U.S. Electric Power Distribution," University of Cambridge, Electricity Policy Research Group Working Paper 0819 (2008).

<sup>7</sup> See Kennedy, Peter, *A Guide to Econometrics*, Third Edition, MIT Press, 1992, p. 79.

<sup>8</sup> See John Kwoka, Sanem Ozturk and Michael Pollitt, "Divestiture Policy and Operating Efficiency in U.S. Electric Power Distribution," University of Cambridge, Electricity Policy Research Group Working Paper 0819 (2008).

254 A. No. Of the six studies Mr. Fenrick relied on, which I was able to review, three are  
255 based on a sample of both vertically integrated and distribution only utilities, like Mr.  
256 Fenrick's sample. None of these studies include a measure of net generation. Mr.  
257 Fenrick's approach is not consistent with the studies that he has relied on.

258 **C. Mr. Fenrick's models are misspecified because irrelevant variables**  
259 **are included**

260 **1. Labor costs**

261 **Q. Does Mr. Fenrick include a reasonable measure of labor costs in his A&G**  
262 **and D&CC models?**

263 A. No. As I discussed in my rebuttal testimony, Mr. Fenrick has failed to  
264 demonstrate that the wage variables in his A&G and D&CC models capture the utilities'  
265 labor costs.

266 **Q. Does Mr. Fenrick respond to your criticism?**

267 A. Only partially. Mr. Fenrick has not responded to my criticism that the BLS wage  
268 data he relies on has no evident relationship to the utilities' labor costs. For example, Mr.  
269 Fenrick's D&CC wage variable is based on the BLS category "Installation, Maintenance,  
270 and Repair Occupations," which includes, for example, "Automotive Body and Related  
271 Repairers" and "Medical Equipment Repairers." By his silence, Mr. Fenrick apparently  
272 concedes that his wage variables are not a reasonable reflection of labor costs for the  
273 various functions embodied in A&G and D&CC for a utility.

274 Mr. Fenrick also does not rebut my criticism that he has failed to account for  
275 changes in real wages over time and changes in relative wages across regions.

276 **Q. Please explain.**

277 A. Mr. Fenrick states that his use of a May 2008 wage measure for every year of the  
278 1994-2007 study period is not a flaw because “This variable is measuring the wage level  
279 encountered by each utility relative to the sample. It is not attempting to measure  
280 inflation...” (CUB-AG Ex. 3.0, p. 14) Mr. Fenrick also claims that the variation in wages  
281 over time is “negligible.”

282 **Q. Is Mr. Fenrick’s claim regarding changes in wage levels over time**  
283 **reasonable?**

284 A. No. Ameren Exhibit 68.3 shows the trends in real wages in Mr. Fenrick’s  
285 categories over the period 1999-2007. These charts show that relative wages did vary  
286 across regions during the study period. In some years, the wage category used in Mr.  
287 Fenrick’s D&CC model varied across regions by 20 percent, and the wage category used  
288 in Mr. Fenrick’s A&G model varied by more than 30 percent. Also, contrary to Mr.  
289 Fenrick’s assertions, real wages fluctuated during his study period.

290 **Q. Doesn’t Mr. Fenrick argue that “the wage level of the utility affect[s] cost”?**  
291 **(CUB-AG Ex. 3.0, p. 11)**

292 A. He does. However, Mr. Fenrick’s wage variables do not capture the labor prices  
293 that the utilities in his sample paid during the study period. His argument that wages  
294 affect costs does not fix this substantial flaw.

295 **Q. Please explain Mr. Fenrick’s discussion of employment cost indices.**

296 A. Mr. Fenrick claims that “BLS data on regional differences in the trends in  
297 employment cost indexes (“ECIs”) for U.S. private industry, from the fourth quarter of  
298 2001 to the fourth quarter of 2007” show little variation in relative wages across regions.

299 (CUB-AG Ex. 3.0, p. 14) However, the regional wage data that Mr. Fenrick cites in his  
300 rebuttal testimony are not the same data that he used in his study. In his A&G and D&CC  
301 models, Mr. Fenrick uses May 2008 wage data reported at the metropolitan area level for  
302 specific occupation categories.<sup>9</sup> The ECIs, on the other hand, are aggregated across all  
303 occupation categories and into just four geographic regions.

304 As Ameren Exhibit 68.3 demonstrates, data from the same source as Mr.  
305 Fenrick's static May 2008 wage level show that contrary to Mr. Fenrick's testimony,  
306 relative wages did change across regions, in some cases by as much as 30 percent. Mr.  
307 Fenrick's failure to account for changes in real wages over time and in relative wages  
308 across regions means that his static wage variable does not reasonably capture the wage  
309 rates during the study period and therefore his models are misspecified.

310 **Q. Do the other studies that Mr. Fenrick cites use similar metrics to capture the**  
311 **effect of wage costs?**

312 A. No. Mr. Fenrick's approach is inconsistent with the previous studies that he cites.  
313 Four of the six studies he cites, which I have been able to review, make annual  
314 adjustments to the wage variable used. The treatment of wages in the other two studies is  
315 unclear.

## 316 2. Undergrounding

317 **Q. Is Mr. Fenrick's business condition variable, percentage undergrounding, a**  
318 **reasonable measure of the extent to which utilities' distribution networks are**  
319 **underground?**

---

<sup>9</sup> For a definition of metropolitan areas as of May 2008, see [http://www.bls.gov/oes/2008/may/msa\\_def.htm](http://www.bls.gov/oes/2008/may/msa_def.htm).

320 A. No. As I discussed in my rebuttal testimony, Mr. Fenrick has failed to  
321 demonstrate that his percentage undergrounding variable, which is based on an  
322 accounting measure of plant in service, provides any information about the extent to  
323 which distribution networks are underground. Because Mr. Fenrick is modeling  
324 distribution O&M costs, he should be considering a physical measure of undergrounding,  
325 not an accounting measure.

326 **Q. Does Mr. Fenrick rebut your criticism?**

327 A. No. Mr. Fenrick's justification for using undepreciated plant in service as reported  
328 in each company's FERC Form 1 is: "In all previous benchmarking work I have been  
329 involved in pertaining to U.S. utilities, the underground variable has been based on  
330 publically available plant in service data." (CUB-AG Ex. 3.0, p. 15) However, this  
331 statement is not consistent with my review of the available studies that Mr. Fenrick  
332 claims to have relied on.

333 **Q. Would you please explain?**

334 A. Of the six studies Mr. Fenrick claims to have relied on, only two studies use the  
335 accounting measure as a claimed control for undergrounding, and one of these two  
336 studies also incorporates a mileage-based measure of network size, something Mr.  
337 Fenrick did not control for. Mr. Fenrick does not demonstrate any relationship between  
338 an accounting measure of plant in service and the actual percentage of circuit miles of  
339 distribution network undergrounded.

340 **Q. You have previously criticized Mr. Fenrick for failing to provide any**  
341 **evidence that his undergrounding variable captures the utilities' share of**  
342 **underground distribution. Does Mr. Fenrick address this in his rebuttal testimony?**

343 A. No. Other than the clearly inaccurate assertion that all other studies he relied on  
344 used this approach, Mr. Fenrick offers no evidence that his undergrounding variable  
345 reflects the actual share of distribution underground.

346 **Q. Mr. Fenrick claims that undergrounding data on a line mile basis “[are] not**  
347 **publicly available for U.S. investor-owned utilities” (CUB-AG Ex. 3.0, p. 15) How**  
348 **do you respond?**

349 A. I have collected data on the percentage of line miles of undergrounded  
350 distribution for 77 utilities, as reported in the 2007 edition of Platts UDI Directory of  
351 Electric Power Producers and Distributors (“2007 Platts Directory”). In Ameren Exhibit  
352 68.4 I compare these data to Mr. Fenrick’s and demonstrate that his variable is biased.

353 **Q. Please explain Ameren Exhibit 68.4.**

354 A. Ameren Exhibit 68.4 presents the ratio of Mr. Fenrick’s accounting-based  
355 undergrounding variable to the utilities’ actual share of distribution lines underground. If  
356 Mr. Fenrick’s accounting-based measure reasonably captured the extent of  
357 undergrounding, the ratio would be approximately 1 for all utilities. However, we clearly  
358 observe bias in Mr. Fenrick’s measure. For utilities that have a small share of distribution  
359 undergrounded, Mr. Fenrick’s measure overstates the extent of undergrounding. For  
360 example, the 2007 Platts Directory reports that 5 percent of Wheeling Power’s  
361 distribution network was undergrounded. Mr. Fenrick claims that 12 percent of Wheeling  
362 Power’s network was undergrounded. For utilities that have a large share of distribution  
363 undergrounded, Mr. Fenrick’s measure understates the extent of undergrounding. For  
364 example, the 2007 Platt’s Directory reports that 75 percent of Nevada Power’s

365 distribution network was undergrounded. Mr. Fenrick claims that only 44 percent of the  
366 network was undergrounded.

367 **Q. Are Mr. Fenrick’s conclusions regarding undergrounding consistent with the**  
368 **literature to which he refers?**

369 A. No, Mr. Fenrick hypothesizes that undergrounding will lower D&CC O&M  
370 expenses. In fact, the literature shows that:

- 371 • Undergrounding is associated with higher total cost and total D&CC cost,  
372 including capital and O&M.
- 373 • Undergrounding is associated with higher distribution capital costs.
- 374 • There is no statistically significant relationship between undergrounding and  
375 distribution O&M costs.
- 376 • Undergrounding is associated with higher Customer Accounts and A&G O&M  
377 expenses.<sup>10</sup>

378 **Q. Has Mr. Fenrick made additional claims regarding his undergrounding**  
379 **variable since his direct testimony?**

380 A. Yes. Mr. Fenrick also claims that “[t]he underground lines variable measures the  
381 amount of employees needed to maintain lines, as well as acting as a proxy for customer  
382 density” (CUB-AG Ex. 1.0, p. 13) In fact, the correlation between his undergrounding  
383 variable and customer density is less than 0.53, suggesting his undergrounding variable is  
384 a poor instrument for customer density. Moreover, all other studies that Mr. Fenrick has  
385 cited control for customer density by using network line miles. Mr. Fenrick apparently

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<sup>10</sup> See John E. Kwoka, “Electric power distribution: economies of scale, mergers, and restructuring,”  
Applied Economics, 2005, 37, 2373–2386.

386 considers customer density to be a factor in utility O&M costs, in which case it is unclear  
387 why he did not choose to control for customer density in a conventional manner that  
388 would be consistent with his these studies.

389 **3. Vegetation Management**

390 **Q. You have previously criticized Mr. Fenrick for failing to provide any**  
391 **evidence that his forestation variable reasonably reflects the utilities' vegetation**  
392 **management requirements. Does Mr. Fenrick adequately address this in his rebuttal**  
393 **testimony?**

394 A. No. Mr. Fenrick merely asserts that “[i]f an overhead line has no trees the  
395 [vegetation management] costs will be minimal...” (CUB-AG Ex. 3.0, p. 12) He does not  
396 rebut my criticism of his variable, percent forested, and does not present any evidence  
397 that the forest inventory data upon which his variable is based are a reasonable measure  
398 of utilities' vegetation management requirements. Moreover, Mr. Fenrick's proxy for  
399 vegetation management conditions, percent forested, is constant across the entire study  
400 period. He presents no evidence in his rebuttal testimony that it is reasonable to assume  
401 vegetation management expenses would not fluctuate.

402 **Q. Is Mr. Fenrick's forestation variable consistent with other cost studies?**

403 A. No. The variable that he claims represents vegetation management, percent  
404 forested is inconsistent with previous studies that he claims to rely on. Of the eight  
405 studies I reviewed, only two attempts to control for vegetation management costs and  
406 only one uses the forestation variable Mr. Fenrick has employed in this study.

407 **Q. Please explain Ameren Exhibit 68.5.**

408 A. Using the U.S. Forest Service data that Mr. Fenrick apparently based his percent  
409 forested variable on, I have examined the change in forestation over time for four  
410 counties included in Mr. Fenrick’s study. Ameren Exhibit 68.5 shows that there is  
411 considerable variation in forestation in these counties over time. In contrast, Mr.  
412 Fenrick’s percent forested variable is constant over the entire study period. Mr. Fenrick’s  
413 percent forested variable fails to capture any of the apparent variation in forestation, and  
414 cannot be considered a reasonable control for vegetation management conditions, which  
415 would affect observed distribution costs.

416 **D. Joint modeling of D&CC costs**

417 **Q. Does Mr. Fenrick justify his choice to model D&CC costs together?**

418 A. No. Mr. Fenrick merely asserts that this is a reasonable approach.

419 “I cannot recall any benchmarking work with which I have been involved  
420 where distribution and customer care were not jointly modeled.” (CUB-  
421 AG Ex. 3.0, p. 16)

422 Moreover, Mr. Fenrick’s statement appears to be misleading. The studies cited by Mr.  
423 Fenrick that I have reviewed all model total cost, not D&CC O&M costs. The literature  
424 indicates that very different factors affect distribution O&M costs and customer care  
425 costs.<sup>11</sup> Mr. Fenrick provides no evidence that his approach in this proceeding is  
426 consistent with the literature or that it is reasonable. In fact, his approach is not consistent  
427 with the literature and is not reasonable.

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<sup>11</sup> See John E. Kwoka, “Electric power distribution: economies of scale, mergers, and restructuring,”  
Applied Economics, 2005, 37, 2373–2386.

428 **VII. MR. FENRICK'S STUDY DOES NOT SUPPORT HIS CONCLUSIONS**

429 **A. Mr. Fenrick overstates his results**

430 **Q. In his rebuttal testimony Mr. Fenrick presents "Econometric Model**  
431 **Confidence Intervals." Please explain Mr. Fenrick's testimony.**

432 A. As I discussed in my rebuttal testimony filed October 23, 2009, in his direct  
433 testimony Mr. Fenrick failed to point out that the statistical properties of his model do not  
434 support his conclusion that the AIUs' are inefficient. In his rebuttal testimony, Mr.  
435 Fenrick asserts that in three out of six instances, AIUs' actual expenses are outside the 95  
436 percent confidence interval around the three-year average results. In fact, Mr. Fenrick has  
437 incorrectly calculated the confidence interval. Mr. Fenrick provides no basis or support  
438 for his method of calculating the confidence interval.

439 **Q. Have you calculated the correct 95 percent confidence interval around Mr.**  
440 **Fenrick's 3-year averages?**

441 A. Yes. Although Mr. Fenrick's model is fatally flawed for all the reasons discussed  
442 above and in my rebuttal testimony, using the appropriate methodology I have calculated  
443 the confidence intervals around Mr. Fenrick's benchmark averages, incorporating his  
444 revised A&G model. Actual AIU A&G and D&CC O&M expenses are within the 95  
445 percent and 90 percent confidence intervals for every year between 2005 and 2007.  
446 Moreover, as we can see in Ameren Exhibit 68.6, the average 2005-2007 A&G and  
447 D&CC expenses for all the AIUs' fall within the 95 percent and 90 percent confidence  
448 intervals around Mr. Fenrick's 3-year benchmark averages.

449 **Q. How would you interpret these results?**

450 A. The only reliable evaluation of the AIUs' expense performance is Mr. Amen's  
451 study. However, the substantial flaws in Mr. Fenrick's model notwithstanding, there is no  
452 basis for Mr. Fenrick's conclusion that the AIUs' are inefficient. The only conclusion  
453 supported by the statistical properties of Mr. Fenrick's flawed and unreliable model is  
454 that the AIUs' are average cost performers.

455 **Q. Please explain Ameren Exhibit 68.7.**

456 A. Ameren Exhibit 68.7 demonstrates the correct formula for calculating a  
457 confidence interval around a multi-year average of predicted values. As we can see in  
458 Ameren Exhibit 68.7, the correct approach to calculating a confidence interval around the  
459 three-year average is based on the average of the individual variances for the predicted  
460 values each of the three years. In contrast, Mr. Fenrick inexplicably divides the standard  
461 error of the regression by 3. The standard error of the regression is a measure of the  
462 variation in all predicted values for all utilities for all years, not the AIUs' for the 2005-  
463 2007 period.

464 **Q. What is the error in Mr. Fenrick's miscalculation of the confidence**  
465 **interval?**

466 A. Mr. Fenrick divides the standard error of the regression by 3, he thereby  
467 understates the standard error of the average and therefore his confidence interval is too  
468 narrow. The correct approach produces a larger standard error for each average and a  
469 wider confidence interval.

470 **Q. Please explain Ameren Exhibit 68.8.**

471 A. Ameren Exhibit 68.8 illustrates the problem with Mr. Fenrick’s approach, which  
472 understates the standard error of a multiyear estimate. As we increase the number of  
473 years over which we are averaging, Mr. Fenrick’s calculation would approach zero too  
474 quickly. His approach is biased and incorrect.

475 **B. Mr. Fenrick’s proposal to use a 68 percent confidence interval to**  
476 **evaluate his results is inappropriate**

477 **Q. What is your reaction to Mr. Fenrick’s claim that a 95 percent confidence**  
478 **interval is “unreasonably high threshold”?**

479 A. In my experience, a 90 percent or 95 percent significance level is standard  
480 practice and not unreasonable. In fact, I note that in the other studies that Mr. Fenrick  
481 claims as the basis for his experience with econometric benchmarking, reliance on a  
482 significance level of at least 90 percent is common in the evaluation of results and no  
483 study uses a significance level of 68 percent.

484 As an alternative to the 95 percent confidence interval I proposed in my rebuttal  
485 testimony, Mr. Fenrick proposes a confidence interval based on a 68 percent significance  
486 level. As we can see in Ameren Exhibit 68.1, this drastically lower significance level is  
487 not used in the studies that Mr. Fenrick relied on.

488 **VIII. MR. FENRICK HAS FAILED TO PRODUCE ADEQUATE**  
489 **INFORMATION REGARDING HIS APPROACH**

490 **Q. Has Mr. Fenrick produced a complete set of his workpapers and reliance**  
491 **materials?**

492 A. No. The production of Mr. Fenrick’s workpapers has been incomplete and  
493 inexplicably delayed. In addition, Mr. Fenrick claims to have relied on 15 previous

494 studies in the formulation of his model for this proceeding, yet he has not produced any  
495 of these studies.

496 **Q. What has been the consequence of this incomplete production?**

497 A. Although I have been able to replicate Mr. Fenrick's results, the delayed and  
498 incomplete production has made the replication process unnecessarily difficult and time-  
499 consuming.

500 **Q. In your experience, is Mr. Fenrick's delay in producing some of his**  
501 **workpapers and failure to produce his reliance materials commonplace?**

502 A. No. Mr. Fenrick's unwillingness to disclose his study methods is unusual and  
503 perplexing. A cornerstone of scientific inquiry is that the research process must be  
504 transparent and the results of legitimate inquiry must be replicable. In this manner  
505 inadvertent error can be detected and addressed. Mr. Fenrick's actions have had the  
506 unfortunate consequence of concealing his approach. In particular, Mr. Fenrick has  
507 indicated that he attempted multiple model specifications, which he rejected. Beyond  
508 vague labels for rejected variables, which do not permit replication, Mr. Fenrick has  
509 failed to provide any further information regarding his discarded model specifications.<sup>12</sup>  
510 Mr. Fenrick also has not revealed whether he used an objective goodness-of-fit statistic to  
511 evaluate alternative model specifications, and if he did, what the results of these tests  
512 were. In light of the multiple variables listed on Ameren Exhibit 68.1 that Mr. Fenrick

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<sup>12</sup> The only information Mr. Fenrick has provided about variables he considered and rejected is: "Variables Mr. Fenrick recalls looking at were: a gas dummy variable, generation dummy variable, and volume per customer in lieu of volume as an output variable." CUB-AG supplemental response to AIU-SAF 1.26. This information is inadequate to evaluate Mr. Fenrick's model selection process.

513 excludes from his model, provision of these rejected alternatives would help immensely  
514 to understand his criteria for model selection.

515 **IX. CONCLUSION**

516 **Q. Dr. Sosa, does this conclude your surrebuttal testimony?**

517 **A.** Yes, it does.