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Issue(s):	Load Forecasting
Witness:	Steven M. Wills
Sponsoring Party:	Union Electric Company
Type of Exhibit:	Surrebuttal Testimony
Case No.:	EO-2011-0271
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MISSOURI PUBLIC SERVICE COMMISSION

Case No. EO-2011-0271

SURREBUTTAL TESTIMONY

OF

STEVEN M. WILLS

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a Ameren Missouri

St. Louis, Missouri
November, 2011

SURREBUTTAL TESTIMONY

OF

STEVEN M. WILLS

CASE NO. EO-2011-0271

Q. Please state your name and business address.

A. My name is Steven M. Wills. My business address is One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. By whom and in what capacity are you employed?

A. I am employed by Ameren Services Company ("Ameren Services") as Managing Supervisor of Quantitative Analytics in the Corporate Planning department.

Q. What is Ameren Services?

A. Ameren Services provides various corporate, administrative and technical support services for Ameren Corporation ("Ameren") and its affiliates, including Union Electric Company d/b/a Ameren Missouri ("Company" or "Ameren Missouri"). Part of that work is performing analyses, including load forecasting work that was included in this Integrated Resource Plan.

Q. Please describe your educational background and employment history.

A. I received a Bachelor of Music degree from the University of Missouri-Columbia in 1996. I subsequently earned a Master of Music degree from Rice University in 1998, then a Master of Business Administration ("M.B.A.") degree with an emphasis in Economics from St. Louis University in 2002. While pursuing my M.B.A., I interned at Ameren Energy in the Pricing and Analysis Group. Following completion of my M.B.A. in May 2002, I was hired by Laclede Gas Company as a Senior Analyst in its Financial Services

Department. In this role I assisted the Manager of Financial Services in coordinating all financial aspects of rate cases, regulatory filings, rating agency studies, and numerous other projects.

In June 2004, I joined Ameren Services as a Forecasting Specialist. In this role, I developed forecasting models and systems that supported the Ameren operating companies' involvement in the Midwest Independent Transmission System Operator, Inc's ("MISO") Day 2 Energy Markets. In November 2005, I moved into the Corporate Analysis Department of Ameren Services, where I was responsible for performing load research activities, providing electric and gas sales forecasts, and assisting with weather normalization for rate cases. In January 2007, I accepted a role I briefly held with Ameren Energy Marketing Company as an Asset and Trading Optimization Specialist before returning to Ameren Services as a Senior Commercial Transactions Analyst in July 2007. I was subsequently promoted to my present position as the Managing Supervisor of the Quantitative Analytics group.

Q. Please describe your duties and responsibilities as Managing Supervisor, Quantitative Analytics.

A. In my current position, I supervise a group of employees with responsibility for short-term electric load forecasting, long-term electric and gas sales forecasting, load research, weather normalization, and various other analytical tasks.

Q. What is the purpose of your surrebuttal testimony?

A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of Missouri Department of Natural Resources ("DNR") witness John Duvalis, which criticizes Ameren Missouri's load forecast. I will explain why the Ameren Missouri

load forecast is sound, reasonable, and compliant with the IRP rules. I will also demonstrate that the issues raised by Mr. Duvalis are either factually incorrect or unsupported speculation.

I. Choice of Driver Variables

Q. What is the first concern Mr. Duvalis raised in his rebuttal testimony?

A. Mr. Duvalis restates a concern from the GDS Associates, Inc. ("GDS") report filed in this docket by DNR on June 23, 2011. He is concerned that Ameren Missouri chose to use the projections provided by its economic vendor, Moody's Analytics, of households in its service territory in developing certain variables used in the forecasting equations, rather than actual Ameren Missouri customer counts.

Q. Has Ameren Missouri already responded to this criticism?

A. Yes. In its response to the other parties' reports, Ameren Missouri addressed this concern. The most relevant part of the response is that the Moody's Analytics household forecast was the most appropriate measure to use in constructing these variables, because it maintains internal consistency in the income per household calculation. This is because the income part of the calculation was also a result of Moody's forecast process and using Moody's income calculation in conjunction with Ameren Missouri's customer forecast would potentially mismatch underlying assumptions. Using Moody's household forecast in conjunction with their income forecast ensures a level of consistency between these variables that would simply not be present if the Moody's income was matched with Ameren Missouri's customer forecast.

Q. Did Mr. Duvalis comment on Ameren Missouri's response?

A. Though he referenced it, he did not address the part of the response described in my previous answer, which is really the crux of the argument. Instead he went on to question the second part of Ameren Missouri's response to this criticism.

Q. Please explain the second part of Ameren Missouri's response and Mr. Duvalis' continuing criticism.

A. The Company indicated that, even if Mr. Duvalis were correct that Ameren Missouri should have used this other variable, it still would not have made a material difference in the forecast or the resulting resource plan because of the particular nature of this variable and the regression model in which it is used. Curiously, Mr. Duvalis agrees that the Company's position is technically and theoretically true, but still desired evidence that in practice this would be the result.

Q. Can you provide such evidence?

A. Yes. Despite my disagreement with Mr. Duvalis' premise that this variable should be used, in order to provide more evidence to the Commission, I ran the forecast[1] using his preferred method.

Q. What was the result?

A. The compound annual growth rate in residential energy over the 20 year forecasting horizon is a mere 0.05% different with this change. And contrary to his contention that we may be overstating the forecast by as much as 10% in 2030, the residential forecast is actually about 1.5% *higher* in 2030 using his method. To put this in

[1] Ameren Missouri actually had 10 different load forecast model results in its IRP, each consistent with one of the scenarios associated with different outcomes pertaining to critical uncertain factors. I ran the forecast from one scenario with the alternate variable. This was the base load growth, base gas price, business as usual carbon policy scenario.

perspective, the total 20 year residential load growth anticipated in the IRP forecast from 2010 to 2030 was approximately 14%, with an uncertainty suggesting the actual growth may range anywhere from 1% to 30%. Changing a variable that results in a 1.5% difference in base growth is really insignificant in the context of the broader uncertainty already identified for growth within this class.

Q. Did any other parties comment on Ameren Missouri's choice of driver variables?

A. Yes. Missouri Public Service Commission Staff ("Staff") witness David Roos indicated the following:

> Staff's review of Ameren Missouri's forecasts found no deficiencies or concerns with the selection or development of the variables used to develop the forecasts. It is Staff's position that Ameren Missouri has provided a reasonable description of a valid process that Ameren Missouri used for selecting and developing its load forecasting variables. (Roos Rebuttal, page 2, lines 12-15.)

Q. What is the rule requirement with which Mr. Duvalis contends Ameren Missouri has failed to comply?

A. 4 CSR 240-22.030(2)(A) states: "The utility shall identify appropriate driver variables as predictors of the number of units for each major class or subclass. The critical assumptions that influence the driver variables shall also be identified."

Q. Has Ameren Missouri complied with this rule?

A. Yes. This is a very clear example of where another party in this case would have chosen a different input, but that disagreement does not mean that the Company has not complied with the IRP rule requirements. Mr. Duvalis has done nothing to rebut Ameren Missouri's primary argument that the variable it utilized was superior to the variable he recommended for use in the forecast. Given that there is no credible evidence that the

variable chosen by Ameren Missouri is in any way inappropriate, the IRP rules provide Ameren Missouri the latitude to select the variable it feels is appropriate in the forecasting process. Ameren Missouri has, as required by the rule, clearly documented its choice of variable. The Commission's review of this alleged deficiency should stop at this point, as there is no evidence that the Company failed to meet the requirements of its IRP rules. However, if the Commission requires more support for the forecast utilized by the Company then they need look no further than Staff, who clearly believes the variable choice was reasonable. Finally, the evidence presented above demonstrates that the impact of selecting the alternate variable is very small and would have a negligible overall impact on the Company's resource plan selection, even if it were appropriate.

II. End Use Load Shapes

Q. What other issues does Mr. Duvalis raise in his rebuttal testimony?

A. Mr. Duvalis contends that the Company has not provided sufficient evidence that the end-use load profiles used in the peak and hourly forecasting process are reasonable.

Q. How do you respond to this concern?

A. I do not agree that Ameren Missouri has provided insufficient evidence on this point. The Company provided extremely detailed workpapers providing both the load shapes it purchased from its vendor, as well as the sophisticated and innovative calibration process where these shapes were tested and adjusted in order to make them as applicable as possible to Ameren Missouri's load. This calibration process is more rigorous than any such process I am aware of in the in the utility industry, and it ensures the applicability of end-use load shapes to the load they are being used on. Mr. Duvalis is concerned that the results of our end-use analysis of the peak load do not match the results from a few other studies selected

by him. Perhaps this is because the other studies lacked the detailed matching of end-use load shapes to final load that Ameren Missouri performed.

Q. Does the analysis presented by Mr. Duvalis on this topic have any errors that need to be corrected?

A. Yes, there was one significant error. He made the same error in the GDS report filed June 23, 2011 in this docket. The Company has already fully documented the error in its response to the reports filed by other parties to this case. However, since Mr. Duvalis repeats parts of the original analysis again in his rebuttal testimony, I will briefly recap the flaw in his analysis here.

Q. What is the error you referred to?

A. Mr. Duvalis compares Ameren Missouri peak load values that include associated transmission and distribution losses to values that appear to be meter level estimates (which exclude such losses) in other studies. This results in a mismatch in the comparison of Ameren Missouri estimates to the other studies of over 9%.

Q. What other comments made by Mr. Duvalis do you wish to respond to regarding the topic of end-use load shapes?

A. The Company, in its response to the reports filed by the various parties in this case, had done a secondary analysis to help alleviate Mr. Duvalis' concern regarding the residential air conditioning load shape. Mr. Duvalis now criticizes that secondary analysis because it was based on load research. He indicates that:

> Ameren Missouri does not really know what its actual 2009 and 2010 residential class peaks were. The "actual" values that are cited are in fact estimates based on the Company's load research data. (Duvalis rebuttal, page 8, lines 1-3).

Q. What is your reaction to this comment?

A. I am extremely surprised that an analyst with the experience of Mr. Duvalis would call into the question the credibility of using load research data for this type of analysis. In fact, any quality analysis of this subject by any utility or industry organization is typically based on load research. There is no utility that I am aware of that directly measures the residential class contribution to its coincident peak summer demand. The costs of doing so would be extremely prohibitive. However, load research is undoubtedly the standard way of measuring class demands in the industry. In Ameren Missouri rate cases, every party that sponsors weather normalization of sales or a Class Cost of Service Study bases those studies on Ameren Missouri load research. I have yet to hear any party complain that the Company provided unreliable load research. So, while it is true that the Company based this secondary analysis on load research, which is technically an estimate, it is also an extremely reliable estimate and in fact the best and most appropriate value for such an analysis given the realities of what data can be collected with the existing utility metering infrastructure and data management systems.

Q. Mr. Duvalis also complains that in a data request response you did not give a more thorough description of the load research process that developed these estimates. Can you respond?

A. Yes. I apparently made the mistake of believing that an analyst with Mr. Duvalis' experience would have a good working knowledge of how utilities conduct load research and that such a detailed description was not necessary. So in order to clarify what was done, Ameren Missouri maintains stratified random samples of customers from each rate class for which it collects hourly consumption data. The samples, consistent with the

accepted utility standard first mandated by the Public Utility Regulatory Policy Act of 1978, are designed to achieve 10% precision with 90% confidence. For the Company's residential class, there are 288 customers in the load research sample. Hourly data is collected and validated for each of these customers in a data base before being used for analysis. The Company then uses a common statistical method called ratio analysis to develop class level estimates of hourly usage based on the hourly sample data and class level consumption data. Class hourly load estimates are further refined through a calibration process. The load data for each class is adjusted for transmission and distribution losses based on Ameren Missouri's loss study and the class loads are aggregated. The aggregated load is compared to the observed system load. Any differences between the aggregated load and the observed system load are allocated to the classes, based on the squared standard error of the original class estimates.

Q. Can you provide any summary statistics to indicate the quality of the load research data used in your analysis?

A. Yes. On the peak days for 2009 and 2010 (the days used in the analysis criticized by Mr. Duvalis), the average precision of the residential estimates (at 90% confidence) were 5.79% and 5.36% respectively, both significantly better than the 10% precision that is typically targeted by utilities for these estimates. The calibration error (as described above, the difference between the aggregated class demands including losses and the observed system load) for the time of peak in 2009 and 2010 were 3.6% and 1.7% respectively. Over the course of the year, the average amount of error in the calibration process was -0.18% and -0.28% respectively for 2009 and 2010. In my experience, these are

excellent results that speak well of the Ameren Missouri load research program and validate the use of these estimates as extremely reliable values for the actual class peak demands.

Q. Mr. Duvalis also suggests that the analysis you performed by comparing the residential peak hour load to the minimum hour 17 load and attributing the difference to air conditioning may be inaccurate because of differences in other end use appliances between these times. How do you respond?

A. My analysis was designed to provide another data point to support the level suggested in our original forecast. I agree that there are other end uses that could differ in load between April and mid-summer, however, I feel comfortable asserting that the overwhelming majority of such difference is driven by air conditioning. This alternate analysis is being used to cross-check a number that we have developed that is very difficult or even impossible to directly measure. The fact that this estimate came back so close to the original forecast should just add a level of comfort with the Company's original analysis.

Q. Mr. Duvalis also did a cross-check against another analysis he developed which did not support your estimated air conditioning peak. Can you please comment on it?

A. Mr. Duvalis compared the implied air conditioning use per customer (which was affected by the error in his calculation discussed above) to a hypothetical average home and did some calculations that purported to show the unreasonableness of the Company's air conditioning peak demand estimates. As discussed in the Company's response document to the original GDS report, Mr. Duvalis used a number of unsubstantiated assumptions in his analysis. This is somewhat surprising again, as Mr. Duvalis apparently has a much higher standard for the rigor he requires of the Company's work than he requires of his own work.

For example, included was an assumption that the average home in Ameren Missouri's service territory had a 2.5 ton air conditioning unit. Mr. Duvalis goes on to criticize Ameren Missouri for not having performed a study to determine the average air conditioner size in its service territory.

Q. Did Mr. Duvalis perform such a study himself?

A. It does not appear that he did. The Company submitted Data Request Ameren-DNR-016 to Mr. Duvalis. He apparently assumed that a 2.5 ton air conditioner was the average for the Ameren Missouri territory based on an article in *Popular Mechanics* magazine, which included the following excerpt:

> A 1500-sq.-ft. ranch-style home, for example, might normally require a 2 ½ ton air conditioner, but if it's not well insulated, or if a good many windows have western exposure, or if the trees offer little direct shade, then a 3-ton unit might be more appropriate.

Q. Should the quote from this article be considered sufficient evidence to support Mr. Duvalis' analysis?

A. No. First of all, the article is just giving an example, and clearly indicates there are many considerations in sizing an air conditioning unit. Secondly, it does not even state what region of the country it is assuming the home is in, which would definitely impact the required air conditioning capacity. Third, the reference explicitly states that the 2.5 ton unit may be appropriate for a 1,500 square foot home. Ameren Missouri's 2009 Market Potential Survey included detailed surveying of its customer base. Based on the results of this survey, the average single family home size in Ameren Missouri's service territory is 1,900 square feet and the average home size including multi-family units is 1,777 square feet. So even if one accepts the assumption posited by this article, the average air conditioner in Ameren Missouri's territory ought to be larger than 2.5 tons. These facts, along with the

other observations in Ameren Missouri's response, demonstrate that Mr. Duvalis' example provides little in the way of reliable information that can be used to accurately estimate the average home air conditioner's contribution to the peak load.

Q. What is the IRP rule requirement that Mr. Duvalis contends Ameren Missouri has failed to comply with?

A. 4 CSR 240-22.030(3)(B)(2) states that: "For each end-use, the utility shall estimate end-use monthly energies and demands at time of monthly system peaks and shall calibrate these energies and demands to equal the weather-normalized monthly energies and demands at time of monthly peaks for each major class for the most recently available data."

Q. Has Ameren Missouri complied with this rule?

A. Yes. As documented in the original filing and substantiated in Ameren Missouri's responses to comments, Ameren Missouri has estimated end-use energies and peaks and calibrated those to the class energies and peaks. In doing so, Ameren Missouri has used the best and most recent available data and methods.

Q. Please summarize your comments on Mr. Duvalis' concern regarding the end-use load shapes that the Company used in its analysis.

A. Mr. Duvalis claims that there is not sufficient support for the end-use load shapes the Company used for its analysis. However, the facts are that there is virtually no support for any of the assumptions or comparison points that he uses in his analysis. The end-use load shapes the Company uses in its analysis are reasonable and very well supported. That said, again the threshold question here is whether the Company has clearly documented its forecasting assumptions and whether there is any error that materially impacts the resource plan. Mr. Duvalis is ultimately doing little more than arguing that the Company did

not use the method he would advocate. That is not a deficiency under the Commission's rules. The Company fulfilled the requirements of the rules and fulfilled them in a reasonable manner. Mr. Duvalis' concerns should be rejected by the Commission.

Q. Does this conclude your surrebuttal testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

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

AFFIDAVIT OF STEVEN M. WILLS

STATE OF MISSOURI)
) ss
CITY OF ST. LOUIS)

Steven M. Wills, being first duly sworn on his oath, states:

1. My name is Steven M. Wills. I am employed by Ameren Services Company as Managing Supervisor of Quantitative Analytics in the Corporate Planning department.

2. Attached hereto and made a part hereof for all purposes is my Surrebuttal Testimony on behalf of Union Electric Company, d/b/a Ameren Missouri, consisting of 13 pages, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Steven M. Wills

Subscribed and sworn to before me this 29th day of November, 2011.

Mary Hoyt
Notary Public

My commission expires: 4-11-2014

Mary Hoyt - Notary Public
Notary Seal, State of
Missouri - Jefferson County
Commission #10397820
My Commission Expires 4/11/2014