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MISSOURI PUBLIC SERVICE COMMISSION

File No. EA-2015-0146

SURREBUTTAL TESTIMONY

OF

ROBERT M. VOSBERG, P.E.

ON

BEHALF OF

AMEREN TRANSMISSION COMPANY OF ILLINOIS

Platteville, Wisconsin
November, 2015

SURREBUTTAL TESTIMONY

OF

ROBERT M. VOSBERG, P.E.

FILE NO. EA-2015-0146

Q. Please state your name, position and background.

A. My name is Robert M. Vosberg, P.E. I am the owner/manager of Vosberg Consulting, LLC, an independent consulting engineering services firm. My address is 1150 Colleen Court, Platteville, WI 53818.

Q. On whose behalf are you testifying?

A. I am testifying before the Missouri Public Service Commission on behalf of Ameren Transmission Company of Illinois (ATXI).

Q. Please describe your educational, professional and business experience.

A. In May, 1978, I received a Bachelor of Science – Engineering from the University of Wisconsin - Platteville. I have completed additional coursework in Electrical Engineering at the University of Wisconsin – Madison School of Electrical Engineering. I have been registered as a Professional Engineer since 1982.

During the 1979 to 1987 time period, I held various positions with Wisconsin Electric Cooperative Association serving as Chief Engineer for the years 1984 through 1987. As Chief Engineer I was responsible for all operations, financial and profit/loss requirements, and personnel and management of a 15-person engineering department. My duties included directly reporting to the Association's Board of Directors, serving as technical liaison on behalf of the Wisconsin Electric Cooperatives at the local, state and national level, preparing testimony and appearing before State and National Regulatory bodies. Additional duties

included responsibility for providing all technical services to electric cooperative association members plus various electric municipals and other rural electric cooperatives, preparing electric rate studies, including approval for electric rate adjustments from various approval authorities, and responsibility for direct interaction with State and Federal Regulatory bodies including testimony and serving on committees that provided recommendations to such regulatory bodies for proposed agency rules and regulations.

During the 1988 to 1995 time period, I held various positions with Scenic Rivers Energy Cooperative. Responsibilities included all engineering requirements, including system planning, system protection, equipment procurement, rate schedules, standards and Cooperative interface with service territory governmental entities. I was responsible for Cooperative litigation, economic development efforts and other special projects. I also performed rate equalization studies and other special projects while also serving on local, State and National committees, and providing technical guidance to various regulatory agencies, regional bodies, economic groups and other associations.

During the 1997 to 2008 time period, I was employed by Alliant Energy, Madison, Wisconsin. Responsibilities included providing technical customer assistance to Alliant Energy's account management team, including preparation of bid documents, contract administration, project management, engineering and procurement, cost management and customer satisfaction. I was also responsible for providing design/build proposals and contracts, including project management for multi-million dollar projects. I have a detailed understanding of transmission systems, tariffs, generation (fossil, diesel, wind, landfill gas, digester), Federal Energy Regulatory Commission (FERC) requirements and regulations, contracts and system control.

During the 2009 to 2012 time period, I served as Senior Vice-President – Transmission & Engineering, for Wind Capital Group. As a member of the senior management team at Wind Capital Group, I was responsible for transmission and interconnection requirements to connect the company's fleet of wind farms. In addition, I assisted with procurement of Purchase Power Agreements, Wind Turbine Contracts, Balance of Plant Contracts and O&M Agreements along with direct involvement in financing packages of wind plant infrastructure. I had individual responsibility for large power transformers, electrical equipment, transmission lines and engineering and transmission system interfaces, and worked with multiple FERC-approved Regional Transmission Organizations, such as the Midcontinent Independent Operator, Inc. (MISO), the Southwest Power Pool (SPP), the Electric Reliability Council of Texas (ERCOT), PJM Interconnection, LLC (PJM) and the Western Electricity Coordinating Council (WECC) regarding Transmission Service and Generator Interconnection. I have also participated in various advisory groups and committees of such Transmission Providers, and provided guidance related to North American Reliability Council (NERC) compliance for generation and transmission facilities.

Since 2012, I have been the Owner of Vosberg Consulting, LLC. This LLC provides technical support to various clients in many aspects relating to new transmission and generation facilities. Responsibilities include interactions with multiple Transmission Providers (PJM, MISO including MISO South, ERCOT, SPP, WECC, etc.) and providing guidance in other regions of the United States such as for SERC Reliability Corporation (SERC) member utilities, including Southern Company, Progress Energy, TVA, Florida Utilities, Electric Municipals and Electric Cooperatives. I also provide guidance to clients

regarding Transmission Market requirements including current and future pricing structures, FERC regulatory requirements and State regulatory requirements. My work also includes assisting U.S. clients on international projects.

Throughout my career I have worked on a nationwide basis providing technical support to multiple clients in the energy field. Specific responsibilities included transmission system interface requirements for utility-based energy projects and working with multiple Transmission Providers such as MISO, SPP, ERCOT, PJM and WECC regarding Transmission Service and Generator Interconnection. I have also participated in various advisory groups and committees of such Transmission Providers, and provided guidance related to NERC compliance for generation and transmission facilities. In addition, I have provided direct guidance regarding initial development of wind turbine dynamic models for use by Transmission Providers and handled the initial technical issues related to wind turbines and Sub-Synchronous Interaction with long 345 kV transmission lines and high voltage DC back-to-back converter stations.

Q. What is the purpose of your testimony in the proceeding?

A. The purpose of my testimony is to respond to the rebuttal testimony of Bill Powers, P.E., and in particular, his contention that the prospects for wind development in North Missouri are poor.

Q. What do you conclude in response to Mr. Powers' testimony?

A. I have approximately 18 years of experience in the wind industry, and for the past 15 years have been deeply involved in the development of wind generation across the country, with a particular emphasis on development in the Midwest. Based upon my experience and examination of publically available National Renewable Energy Laboratories

(NREL) data, as well as Mr. Powers' Exhibit PE-08, I conclude that there is significant potential for wind development in north central and northeast Missouri, including in the Adair Wind Zone. That potential cannot be realized without the addition of a 345 kV transmission line such as the one proposed in this case.

Q. Please describe the 345 kV transmission line proposed in this case.

A. The project that ATXI refers to as the Mark Twain Project is the Missouri portion of MISO's Multi-Value Projects (MVPs) which MISO has designated by MISO as MVP Nos.7 and 8. MISO MVP Project #7 begins at the Ottumwa, Iowa Generating Station and extends to a new substation location near Adair, Missouri. MISO MVP Project #8 begins at the new substation location near Adair, Missouri and extends to a location near Palmyra, Missouri. These two projects provide a 345 kV path through north-central/eastern Missouri. In total, the Mark Twain Project that is the subject of this case is composed of approximately 95 miles of new 345 kV line that will be constructed from the Iowa-Missouri border to a new 345/161 kV substation that will be constructed near Adair (which MISO has designated as the West Adair Substation and ATXI refers to it as the Zachary Substation) and from there to a new 345 kV switching station will be constructed near Palmyra and has been designated by MISO as the Palmyra Tap Substation (ATXI calls it the Maywood Switching Station). The Project also includes a new 2.2 mile 161 kV line from the new 345/161 kV West Adair Substation to the existing Adair substation. The new Palmyra Tap Substation will tie the new 345 kV transmission line from the West Adair Substation with existing 345 kV transmission lines serving Missouri and a new 345 kV transmission line that will extend to a location near Quincy, Illinois.

Q. Please describe justification for this project.

A. The new 345 kV transmission lines, the new 345/161 kV substation, and the new 161 kV transmission line described above will provide an outlet for generation located in north-central and northeast Missouri to loads in Missouri and across the Midwest. In addition, this new transmission line will provide a path for renewable generation located north and west of Missouri (e.g., in Iowa, Minnesota, the Dakotas) to be delivered to load centers south and east, including to Missouri. These two new 345 kV projects will improve local and regional transmission system reliability by resolving existing congestion and outage contingencies in the Northeast Missouri area. The addition of the West Adair 345/161 kV Substation is critical to resolving 161 kV overloads in northeast Missouri and addressing low voltage concerns. Generator interconnection studies for projects in northeast Missouri consistently show significant overloads on the existing 161 kV transmission system when attempting to add generation.

Q. Please describe study work that determined the need for the Ottumwa – Adair – Palmyra 345 kV transmission project.

A. MISO completed a Regional Generator Outlet Study (RGOS) with an initial goal of designing a transmission portfolio that would enable renewable portfolio standards (RPS) mandates, in various states, to be met at the lowest delivered wholesale energy cost. The cost analysis evaluated the cost of new transmission projects with the cost of the new renewable generation. A key component of the RGOS was development of Energy Zones across the MISO footprint based upon a number of factors. While much consideration was given to renewable energy capacity factors when developing the Energy Zones utilized in the RGOS study and resulting MVP transmission projects, the zones were chosen with consideration of additional factors beyond the need for renewable energy. Existing

infrastructure, such as transmission and natural gas pipelines, also influenced the selection of the Energy Zones. As such, although the Energy Zones were primarily created to serve the renewable generation mandates, they can be used for a variety of different generation types, to serve current and future load and support various long-term generation and public policies.

As part of the RGOS study, two Energy Zones were developed for MISO's footprint in Missouri. One Energy Zone is located in northwest Missouri and a second, larger Energy Zone is located in northeast Missouri, roughly encompassing the counties of Schuyler, Putnam, Adair, Knox, Sullivan, Mercer, Grundy and Scotland. This second Energy Zone is a key component in driving the need for the Ottumwa – Adair – Palmyra 345 kV Transmission Line as a MISO MVP project.

Q. What are the benefits of the Northeast Missouri Energy Zone as described in MISO's RGOS study?

A. The northeast Missouri Energy Zone has the opportunity for significant generation development, more specifically renewable generation in the form of wind generation as shown on Schedule RMV-SR1. This region has topography and wind speeds favorable to the development of wind generation especially with current wind turbine technology. MISO's RGOS study calculated a base of 500 MWs of additional generation that can be developed in the northeast Missouri Energy Zone to serve Missouri load or other states with RPS requirements. Further analysis in MISO's studies indicate an additional 847 MW of generation (for a total of 1347 MW) can be developed in this Energy Zone. This generation development in northeast Missouri becomes possible with the addition of the Ottumwa – Adair – Palmyra 345 kV Transmission Line.

Q. As noted, Mr. Powers indicates that the potential for wind development in the area is poor, suggesting that the Ottumwa – Adair – Palmyra 345 kV transmission line will not bring wind development in Northern Missouri. Do you agree?

A. No, I do not agree. As outlined earlier, MISO has estimated that there is 1,347 MW of potential wind generation in this area of Missouri. Based upon my familiarity with the wind characteristics and other factors, including National Renewable Energy Laboratory data as shown in Schedule RMV-SR1, it is my opinion that the Ottumwa – Adair – Palmyra Project will facilitate the development of at least 1,000 MWs of wind generation in Northern Missouri. This is consistent with MISO's analysis that indicates up to 1,347 MW may be developed. The vast majority of this wind energy cannot be delivered to load (including Ameren Missouri load) without the addition of the Mark Twain Project. While there may be opportunities to upgrade existing infrastructure to allow interconnection of some additional wind generation, these upgrades generally would not allow delivery of the generation to Ameren Missouri load without causing system congestion that would effectively limit the amount of energy that could be delivered.

Q. Do the upgrades Mr. Powers proposes for the Adair-Novelty 161 kV line guarantee that 570 MW of wind generation can be safely and reliably connected to the grid in Northeast Missouri?

A. No. Mr. Powers provides insufficient information about the hypothetical wind generator that is connecting to the grid in Northeast Missouri. In order to determine the location, number and size of system upgrades needed to provide a generator guaranteed interconnection capability, a formal MISO study must be performed that requires the

information that Mr. Powers fails to provide. Consequently, there is no guarantee that the upgrade proposed by Mr. Powers in isolation will result in any significant increase in the capability of the existing grid in Northeast Missouri to safely and reliably interconnect additional wind generation as he suggests.

Q. Does the cost of connecting to the grid influence where generation developers locate their projects?

A. Yes. The interconnection costs impact the developer's business models and can vary greatly depending upon several primary factors including: amount of generation connecting, physical location and capability of the transmission system where the interconnection physically occurs, and limitations due to congestion on the ability to transfer energy across the region.

Q. Will the Project as part of the MVP Portfolio impact these primary factors?

A. Yes. The Project "check's the boxes" that are important to developers by being physically near the Northern Missouri wind zone and by greatly increasing the capability of the transmission system where the interconnection will occur. It also provides tremendous capacity for energy transfers across the MISO footprint and beyond without the significant limitations caused by system congestion.

Q. Based upon your experience in the wind development industry, will the improved transmission capability provided by the Project and the MVP Portfolio translate into increased development of the Northern Missouri wind zone?

A. Yes. The Project provides a significant improvement over the existing transmission system in Northern Missouri and therefore I believe the wind zone will experience increased developer interest as the Project moves closer to completion.

Q. What alternatives did MISO consider during the RGOS study for the Ottumwa – Adair – Palmyra 345 kV transmission line?

A. MISO evaluated an alternate 345 kV transmission line connecting the Thomas Hill Generating Station with the West Adair substation. This 345 kV alternative provided additional generation outlet for the northeast Missouri Energy Zone, but did not provide the additional 345 kV transmission outlet provided by a 345 kV line connecting to the Palmyra Tap Substation. In the final analysis, MISO determined that a 345 kV line from West Adair to Thomas Hill did not provide adequate benefits to be included in the MVP Portfolio.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Ameren Transmission Company of Illinois for Other Relief or, in the Alternative, a Certificate of Public Convenience and Necessity Authorizing it to Construct, Install, Own, Operate, Maintain and Otherwise Control and Manage a 345,000-volt Electric Transmission Line from Palmyra, Missouri, to the Iowa Border and an Associated Substation Near Kirksville, Missouri.	)))))))	File No. EA-2015-0146

AFFIDAVIT OF ROBERT M. VOSBERG, PE

STATE OF LOUISIANA)
) ss
PARISH OF)

Robert M. Vosberg, being first duly sworn on his oath, states:

1. My name is Robert M. Vosberg. I work in Platteville, Wisconsin, and I am employed by Vosberg Consulting, LLC.

2. Attached hereto and made a part hereof for all purposes is my Surrebuttal Testimony on behalf of Ameren Transmission Company of Illinois consisting of 18 pages, and Schedule(s) RMV-SR1 all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

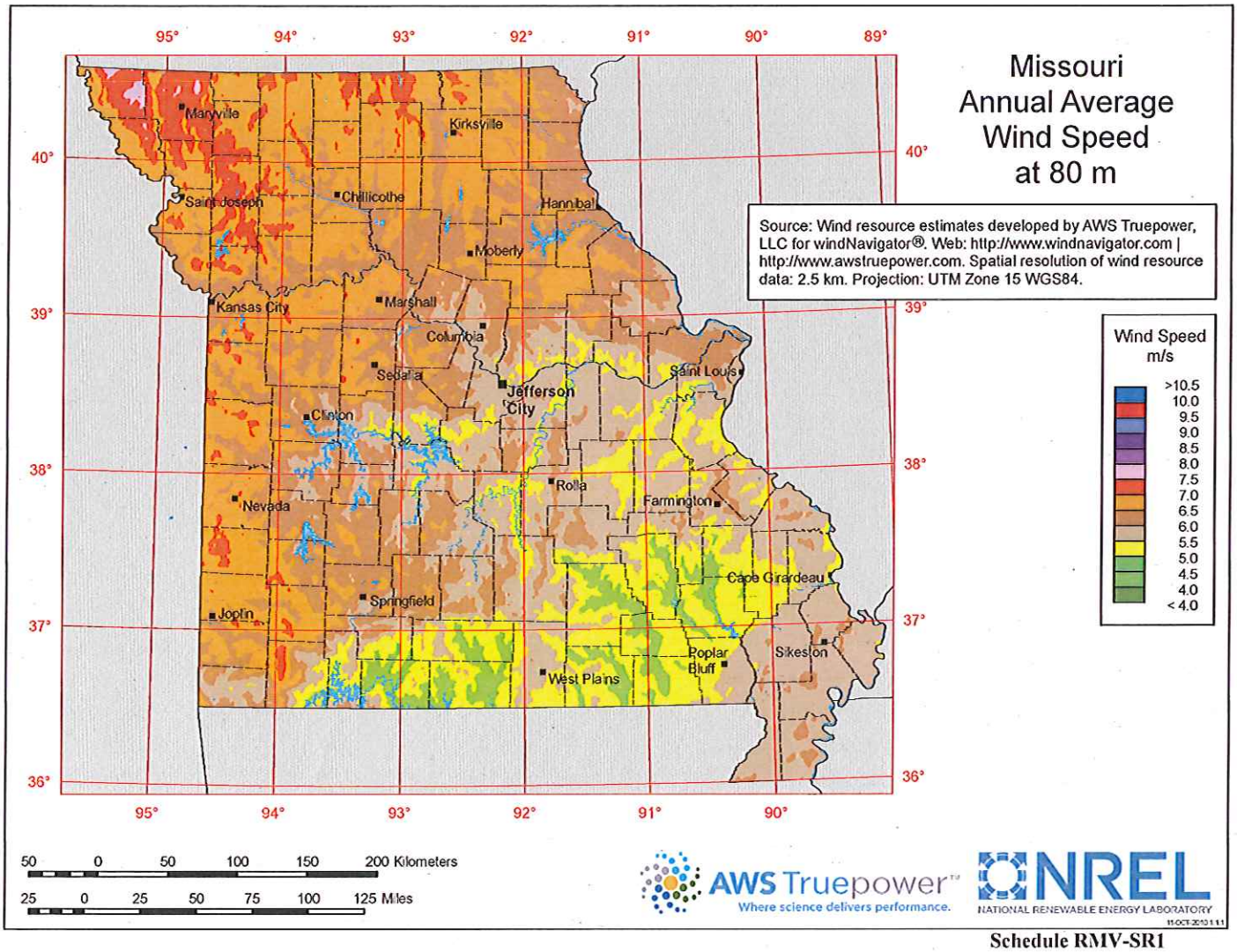
3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Robert M. Vosberg
Robert M. Vosberg

Subscribed and sworn to before me this 16th day of November, 2015.

Paul T. Chastant
Notary Public
13553
34482

My commission expires:



Schedule RMV-SR1