BEFORE THE
ARKANSAS PUBLIC SERVICE COMMISSION

IN THE MATTER OF THE APPLICATION	**)**	
OF ENTERGY ARKANSAS, INC. FOR A	**)**	**DOCKET NO. 16-004-U**
CERTIFICATE OF PUBLIC CONVENIENCE	**)**	
AND NECESSITY TO CONSTRUCT,	**)**	
OPERATE, AND MAINTAIN A NEW 500 KV	**)**	
SUBSTATION AND ASSOCIATED	**)**	
FACILITIES, IN CRIAGHEAD COUNTY,	**)**	
ARKANSAS	**)**	

DIRECT TESTIMONY

OF

EDIN HABIBOVIC

MANAGER OF EXPANSION PLANNING

MIDCONTINENT INDEPENDENT SYSTEM OPERATOR, INC. (“MISO”)

MARCH 15, 2016

I. INTRODUCTION AND BACKGROUND

Q. PLEASE STATE YOUR NAME, EMPLOYER, JOB TITLE, AND BUSINESS ADDRESS.

A. My name is Edin Habibovic. I am employed by Midcontinent Independent System Operator, Inc. ("MISO"), the transmission system operator for Entergy Arkansas, Inc. ("EAI"), as the Manager of Expansion Planning for MISO South in the Transmission Access Management Department. My business address is Two Lakeway, 3850 N. Causeway Blvd., Suite 442, Metairie, Louisiana 70002.

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND?

I graduated from Lamar University with a Bachelor of Science Degree in Electrical Engineering. Also, I received a Master of Science in Electrical Engineering from Southern Methodist University.

Q. ARE YOU A PROFESSIONAL ENGINEER?

Yes. I am a registered professional engineer in the State of Mississippi.

Q. WHAT ARE YOUR PROFESSIONAL AND WORK EXPERIENCES?

A. In August 2001, I was employed as an Electrical Design Engineer for Entergy Services, Inc. In this capacity, I oversaw and managed projects designed by outside contractors; designed transmission substation facilities ranging from 13.8-

500 kV; wrote scope documents and schedules for specific projects; directed the preparation of drawings with specific types of equipment and materials to be used in construction; estimated material, and equipment costs.

From August 2005, I was employed as a planner in the Technical System Planning group for Entergy Services, Inc. My tasks included performing long-term strategic transmission planning studies to ensure that the electrical transmission system was properly planned and remained compliant with all applicable NERC Transmission Planning Standards ("TPL"), FAC, and other standards.

I have been employed by MISO since January 2014, when I became a manager of expansion planning for MISO South.

Q. WHAT ARE THE DUTIES AND RESPONSIBILITIES OF YOUR PRESENT ASSIGNMENT AS MANAGER OF EXPANSION PLANNING?

A. I guide and manage the long-term reliability assessment studies. These studies are used to develop the annual MISO Transmission Expansion Plan ("MTEP") that is presented to MISO's Board for approval. I help ensure adherence with applicable Transmission Owner planning criteria, state mandates, FERC orders, and NERC Reliability Planning Standards. I am involved in implementing MISO Tariff provisions regarding these reliability responsibilities, and ensuring compliance with FERC Order 890 and Order 1000 by leading MISO's open and transparent planning process and conducting public discussion of the resulting transmission projects in MISO-led Subregional Planning Meetings.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony supports EAI's Application that requests a Certificate of Public Convenience and Necessity to construct and operate a new 500/161 kV transmission substation to be located near Jonesboro in Craighead County by tapping into the Independence Steam Electrical Station ("ISES") to Dell 500 kV transmission line and tying in the Jonesboro Hergett to Jonesboro and the Jonesboro Hergett to Trumann 161 kV transmission lines (the "Proposed Transmission Project").[1] The Proposed Transmission Project would involve EAI connecting these transmission lines together in the proposed transmission substation through a 500/161 kV autotransformer and related 500 kV and 161 kV switchyards.

My testimony explains the MISO planning process, including the relationship between the transmission planning group at MISO and EAI's Transmission Planning Department. My testimony summarizes MISO's results that show the electrical need for the Proposed Transmission Project.

[1] Although not included in the Proposed Transmission Project, Entergy intends to upgrade the existing Jonesboro Hergett to Trumann 161kV transmission line and reconductor the Jonesboro to Southwest Power Administration Jonesboro 161 kV transmission line.

II. MISO TRANSMISSION PLANNING OBJECTIVES AND PROCESSES

Q. WHAT IS MISO?

A. MISO is a not-for-profit, member-based, regional transmission organization providing reliability and market services over 65,700 miles of transmission lines in fifteen states and one Canadian province. MISO's footprint stretches from the Ohio-Indiana line in the east to eastern Montana in the west, and south to New Orleans. MISO's South Region serves parts of Arkansas, Louisiana, Mississippi, and Texas. MISO is governed by a ten-member Board of Directors, consisting of nine independent directors and the MISO President.

Q. WHAT ARE THE PRINCIPLES OF THE MISO PLANNING PROCESS?

A. Regional planning at MISO is performed in accordance with several guiding documents. The Agreement of Transmission Facilities Owners to Organize the Midcontinent Independent System Operator, Inc., a Delaware Non-Stock Corporation ("TOA") includes the planning framework that describes the planning responsibilities of MISO and its transmission owning members.[2] Responsibilities of MISO include the development of MTEP in collaboration with transmission owners and stakeholders based upon local, state, and federal (NERC) planning criteria.

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[2] *See* MISO Transmission Owners Agreement ("TOA"), Appendix B, Section VI, publicly available at: https://www.misoenergy.org/Library/Repository/Tariff/Rate%20Schedules/Rate%20Schedule%2001%20-%20Transmission%20Owners%20Agreement.pdf.

MISO also adheres to the nine planning principles outlined in FERC Order No. 890[3] and reinforced in FERC Order 1000.[4] In so doing, MISO provides an open and transparent regional planning process that results in recommendations for expansion that are reported in the MTEP.

Q. WHAT ARE THE OBJECTIVES OF THE MISO PLANNING PROCESS?

A. Consistent with the planning principles described above, the objectives of the MISO planning process are (i) to identify transmission system expansions that will ensure the reliability of the transmission system that is under the operational and planning control of MISO, (ii) to identify expansion that is critically needed to support the reliable and competitive supply of electric power by this system, and (iii) to identify expansion that is necessary to support energy policy mandates in effect within the MISO footprint.

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[3] *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, FERC Stats. & Regs. ¶ 31,241, *order on reh'g*, Order No. 890-A, FERC Stats. & Regs. ¶ 31,261 (2007), *order on reh'g and clarification*, Order No. 890-B, 123 FERC ¶ 61,299 (2008), *order on reh'g*, Order No. 890-C, 126 FERC ¶ 61,228 (2009), *order on clarification*, Order No. 890-D, 129 FERC ¶ 61,126 (2009). "The Transmission Provider's planning process shall satisfy the following nine principles, as defined in the Final Rule in Docket No. RM05-25-000: coordination, openness, transparency, information exchange, comparability, dispute resolution, regional participation, economic planning studies, and cost allocation for new projects." Order 890-B, Attachment K.

[4] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, 136 FERC ¶ 66,051 (2011), *order on reh'g*, Order No. 1000-A, 139 FERC ¶ 61,132 (2012), *order on reh'g and clarification*, Order No. 1000-B, 141 FERC ¶ 61,044 (2012).

Q. HOW DOES MISO COORDINATE ITS TRANSMISSION PLANNING WITH EAI'S TRANSMISSION PLANNING DEPARTMENT?

A. MISO uses a "bottom-up, top-down" approach in developing the MTEP plan. The "bottom-up" portion relies on the ongoing responsibilities of the individual transmission owners to continuously review and plan to reliably and efficiently meet the needs of their local systems. This includes the responsibility to plan for the EAI transmission system, which is the responsibility of EAI's Transmission Planning Department. MISO reviews these local planning activities with stakeholders and performs a "top-down" review of the adequacy and appropriateness of the local plans in a coordinated fashion with all other local plans to most efficiently ensure that all of the needs are met cost effectively. MISO considers, together with stakeholders, improvements and expansions that will reduce consumer costs by providing alternatives to these transmission solutions that allow further access to new low-cost resources that are consistent with, and required by, evolving legislative energy policies.

III. RELIABILITY PLANNING CONSIDERATIONS

Q. WHAT MUST BE CONSIDERED IN PLANNING TO MAINTAIN A RELIABLE TRANSMISSION SYSTEM?

A. A transmission system must have capacity sufficient to meet projected power flows while maintaining required voltage levels and system stability.

Q. WHAT WERE THE KEY FACTORS THAT LEAD TO RECOMMENDING THE PROPOSED TRANSMISSION PROJECT?

A. The Proposed Transmission Project was recommended based on the need to ensure the system has sufficient capacity to meet projected power flows while maintaining required voltage levels.

Q. HOW DO YOU DETERMINE IF A TRANSMISSION SYSTEM HAS CAPACITY SUFFICIENT TO MEET PROJECTED POWER FLOWS WHILE MAINTAINING REQUIRED VOLTAGE LEVELS?

A. This determination requires an engineering evaluation of the system as a whole, as well as an evaluation of critical individual system components (transformers, lines, switchgear), under both normal and contingency conditions (conditions where one or more system components are out of service). Power system simulation models are developed for use in these analyses. Projected peak load power flows for each major component are checked to ensure that rated capacities are not exceeded.

Voltage levels are also checked to ensure that voltage levels are maintained above the minimums required for safe operation of the system and for the supply of adequate voltage to customers.

Q. WHY IS IT NECESSARY TO PROVIDE CAPACITY TO MEET PROJECTED POWER FLOWS?

A. There are several reasons. First, overloaded equipment threatens the system's ability to continue to provide adequate and reliable service to its customers. Overloaded equipment can fail and cause blackouts (which, when due to failure of major transmission components, can be widespread and extended) as well as potentially dangerous conditions. In addition, overloads reduce the service life of equipment and tend to increase the probability of component failure in the future.

Q. WHY IS IT NECESSARY TO ENSURE THAT VOLTAGE LEVELS ARE MAINTAINED?

A. Transmission voltages must be maintained within specified tolerances both to ensure that adequate customer voltage is maintained and to ensure that relays and other voltage-sensitive equipment operate properly. Customer voltage is dependent on a number of variable factors, which include transmission voltage level, load magnitude, and load power factor.

Q. WHY DO YOU STUDY CONTINGENCY CONDITIONS AS WELL AS NORMAL OPERATING CONDITIONS?

A. Generating units and major transmission system components cannot be assumed to be in operation 100 percent of the time. In addition to scheduled maintenance requirements, unscheduled outages can occur. Therefore, reliability must be maintained for an appropriate range of possible system failures. For example, the transmission system must, at a minimum, continue to operate adequately with any single line or transformer in an area out of service.

Q. ARE THERE ANY OTHER FACTORS THAT MUST BE CONSIDERED IN EVALUATING ALTERNATIVE PLANS ONCE THE NEED FOR TRANSMISSION SYSTEM REINFORCEMENT IS DEMONSTRATED?

A. Yes. Effects on other portions of the existing, interconnected transmission system must be considered. A plan must also be capable of being constructed and operated within the time required to meet the need. The plan should avoid excessive equipment damage or widespread service outages in case more severe events occur. Finally, a suitably robust plan should also consider longer-range requirements for system operation with future growth.

Q. ARE THERE STANDARDS THAT GOVERN PLANNING PRACTICES TO ENSURE RELIABLE TRANSMISSION SYSTEM PERFORMANCE?

A. Yes. MISO plans in compliance with NERC, regional reliability entity, and the transmission owning members' planning standards.

Q. WHAT IS THE NERC TRANSMISSION PLANNING STANDARD AND WHAT DOES IT REQUIRE?

A. The NERC TPL reliability standard is applicable to transmission planning and governs planning requirements to ensure reliable transmission system performance. The standard addresses system performance: under normal (no contingency) conditions; following events resulting in the loss of a single transmission element (single contingency); following events resulting in loss of multiple elements (multiple contingency); and following more extreme events that result in loss of many electrical system elements such as the loss of an entire generating station or the loss of all transmission lines on a common right-of-way.[5]

Q. DO SYSTEM PERFORMANCE REQUIREMENTS EXIST UNDER THE NERC TRANSMISSION PLANNING STANDARD RELEVANT TO THE PROPOSED TRANSMISSION PROJECT?

A. Yes. For all but the extreme events, the standard requires that facilities remain at all times within applicable thermal and voltage ratings.

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[5] *See* NERC Transmission Planning Standard, TPL-001-4, publicly available at: http://www.nerc.com/files/TPL-001-4.pdf.

Q. WHAT REGIONAL RELIABILITY ENTITY IS RESPONSIBLE FOR THE ENTERGY TRANSMISSION SYSTEM?

A. The SERC Reliability Corporation ("SERC") is the regional entity responsible for ensuring the reliability and adequacy of the Entergy Transmission System through the establishment of regional reliability standards.

Q. ARE THERE ADDITIONAL SERC STANDARDS THAT ARE RELEVANT TO THE PROPOSED TRANSMISSION PROJECT?

A. No. MISO's justification was based on the NERC TPL standard, which is not modified by SERC regional standards.

IV. <u>REVIEW OF THE PROPOSED TRANSMISSION PROJECT</u>

Q. HOW WAS THE RELIABILITY ASSESSMENT PERFORMED ON THE REGION?

A. As described earlier, an engineering evaluation including a near-term and long-term reliability assessment was performed on the Entergy Transmission System. This analysis documented the system's response under normal conditions and under a set of contingency conditions. This response was then compared to established voltage criteria and the rated capacity of each transmission system component.

Q. PLEASE DESCRIBE THE GENERAL CHARACTERISTICS OF THE TRANSMISSION SYSTEM IN THE REGION WHERE THE PROPOSED TRANSMISSION PROJECT IS LOCATED.

A. The Proposed Transmission Project impacts the 161-115 kV bulk electric system, which includes the areas around Walnut Ridge and Jonesboro in the north, and the regions of Newport, Trumann, Harrisburg, Marked Tree, and West Memphis at its southern edge.[6] The ISES to Dell 500 kV line overlays upon the 161-115kV transmission network, and is a major source of injection of power into the underlying network. The network has a high concentration of load, and is therefore vulnerable to low voltages.

Q. WHAT WERE THE RESULTS OF THE RELIABILITY ASSESSMENT PERFORMED ON THE REGION?

A. As part of 2015 MTEP reliability assessment, MISO performed a comprehensive contingency analysis for the years 2017, 2020, and 2025. In this area, both voltage and thermal constraints were identified by applying contingencies such as single line outages, transformer outages, opening of a line section without a fault, bus section faults, and internal-breaker faults. Single contingency events, such as single line outages of Jonesboro (EAI) to Jonesboro (SPA) 161 kV or Newport to Newport Industrial 161 kV, outage of the West Memphis 161-500 kV

[6] The Proposed Transmission Project is displayed in the Application for this docket in its Exhibit A.

autotransformer, or opening of a line section Dell to Osceola North 161 kV without a fault caused low voltage violations around Trumann, Jonesboro, Newport, Cash, Harrisburg, and West Memphis.

Thermal overloads were observed on the Trumann to Trumann West 161 kV and Paragould to Paragould South 161 kV lines due to the breaker-to-breaker line outage and associated single line section outages of Newport to Newport Industrial to Newport AB to Cash to Jonesboro (EAI) 161 kV line. Additionally, the Marked Tree to Harrisburg 161 kV line overloaded for the single contingency loss of the Jonesboro (EAI) to Jonesboro (SPA) 161 kV line and the Parkin to Gilmore to Wilson 161 kV lines overloaded for the single contingency loss of the Dell – Osceola 161 kV line. Finally, the Lehi West – West Memphis – Polk Ave 161 kV line under different line section outages is loaded over 95 percent of its thermal loading.

Q. DOES THE PROPOSED TRANSMISSION PROJECT IMPROVE RELIABILITY IN THE AREA OF ITS CONSTRUCTION?

A. Yes, this project successfully improves the reliability of the 161-115 kV transmission network around Jonesboro, Trumann, Newport, Osceola, West Memphis, and elsewhere by mitigating the reliability constraints summarized earlier.

The Proposed Transmission Project provides voltage support, and alleviates thermal violations in the 161-115 kV bulk electric system with the construction of the new Jonesboro EHV 500-116 kV substation by tapping into the ISES to Dell 500 kV line and tying in the Jonesboro Hergett to Jonesboro and the Jonesboro Hergett to Trumann 161 kV lines into the new station.

Q. WERE ANY ALTERNATIVE TRANSMISSION PROJECTS CONSIDERED BY MISO?

A. Yes, an alternative transmission solution was evaluated wherein capacitor banks would be added at several strategic locations in the 161-115 kV transmission network to address the voltage constraints. In addition to the capacitor banks, upgrades to the overloaded lines described above would be required to resolve the thermal overloads caused by contingencies in the area.

Q. WHY WAS THIS ALTERNATIVE PROJECT NOT SELECTED?

A. The addition of several capacitor banks would not provide the wider system support that will be provided by the Proposed Transmission Project, and would lead to capacitor banks switching issues. Also, upgrade of overloaded lines would be costly and difficult to accomplish due to necessary prolonged outages. The Proposed Transmission Project provides a more robust voltage and capacity support by cutting into the ISES to Dell 500 kV transmission line and connecting it to the heart of the underlying 161-115 kV network. This configuration provides a more effective and lasting solution that enables future load growth.

V. CONCLUSION

Q. WHAT IS YOUR CONCLUSION?

A. MISO concurs with EAI's Transmission Planning Department that the Proposed Transmission Project is needed. As a result, MISO included the Proposed Transmission Project in the 2015 MTEP.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

CERTIFICATE OF SERVICE

I, Randall L. Bynum, do hereby certify that a copy of the foregoing has been served upon all parties of record by forwarding the same by electronic mail and/or first class mail, postage prepaid this 15th day of March 2016.

/s/ Randall L. Bynum
Randall L. Bynum