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Witness: Shaen T. Rooney
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Before the Public Service Commission of the State of Missouri

Direct Testimony

of

Shaen T. Rooney

on behalf of

The Empire District Electric Company

May 2021

DENOTES CONFIDENTIAL
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PUBLIC VERSION

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THE EMPIRE DISTRICT ELECTRIC COMPANY
BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION
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DIRECT TESTIMONY OF SHAEN T. ROONEY
THE EMPIRE DISTRICT ELECTRIC COMPANY
BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION
CASE NO. ER-2021-0321

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Shaen T. Rooney, and my address is 602 Joplin Street, Joplin, Missouri, 64801.

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

A. I am employed by Liberty Utilities Service Corp. as the Senior Manager of Strategic Projects for the Liberty Central Region. My primary responsibility is managing large capital projects in energy supply for The Empire District Electric Company ("Empire" or "Company"). I am also responsible for Empire's environmental department, which works to ensure Empire's operations remain compliant with state and federal regulations.

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

A. I am testifying on behalf of Empire.

Q. Please describe your educational and professional background.

A. I graduated from the University of Missouri-Columbia in 2001 with a Bachelor of Science Degree in Chemical Engineering. In February 2002, I was employed by the Missouri Department of Natural Resources' Air Pollution Control Program as an environmental engineer, primarily responsible for air quality planning, especially focused on construction permitting, energy production, and fuels. In November 2004, I joined Empire as Environmental Coordinator. In that position, I was responsible for assisting management with Empire's generating fleet operations in order to comply

with state and Federal air pollution regulations. I was also responsible for obtaining necessary air permits for construction projects. From October 2006 until June 2008, I was employed as the Local Projects Manager at the Company's Asbury Generating Station. Duties included assisting in power plant construction projects, including the construction of a selective catalytic reduction (SCR) system, and various operating & maintenance ("O&M") activities. In June 2008, I took a position as a Plant Operations Supervisor at the Asbury Generating Station. My duties included leading a team of plant operators in the operation of the plant, while prioritizing safety, maximizing production, and maintaining compliance with all applicable state and Federal regulations. In November 2010, I assumed the position of Manager of Strategic Projects, where I was responsible for generation resource planning, origination of projects, development of project specifications, selection of contractors, and oversight of project progress. During my time as Manager of Strategic Projects, the Company executed the Asbury ("Air Quality Control System") AQCS retrofit and Riverton 12 Combined Cycle Conversion. In May 2015, I returned to the Asbury Generating Station, this time as the Plant Operations Manager. My responsibilities in this role were to set plant goals that aligned with the Company's goals and to lead all plant operations teams to achieve those goals while remaining focused on safety, maximizing production, and complying with all applicable regulations. In June 2018, I assumed the position of Generation Operations Project Manager, where my responsibilities were the same as when I had been employed as Manager of Strategic Projects. In August 2019, management of the Company's environmental department was added to my responsibilities, and my title was change to Senior Manager of Strategic Projects.

Q. Have you previously testified before the Missouri Public Service Commission ("Commission") or any other regulatory agency?

A. This is the first opportunity I have had to testify before this Commission. I have previously testified before the Oklahoma Corporation Commission.

Q. What is the purpose of your Direct Testimony in this proceeding?

A. The purpose of my testimony is to provide details on the status of the three wind projects for which the Commission granted Certificates of Convenience and Necessity in File No. EA-2019-0010 (the "CCN Order"), including how the wind projects are being operated, and how Empire's acquisition of the three wind holding companies described in the Direct Testimony of Todd Mooney in this case meet certain requirements of the CCN Order. I will also testify on other significant projects at Empire's generation facilities that are included in this case. Finally, given my previous roles with the Company, my testimony also supplements that provided by Company witness Aaron J. Doll, by conveying additional technical background on the changes in operations and maintenance practices previously implemented at Asbury to help the plant better compete in the Southwest Power Pool Integrated Marketplace ("SPP IM") ahead of the eventual decision to retire the plant.

II. THE STATUS OF THE WIND PROJECTS

Q. Please provide the status of the three Wind Projects that were the subject of File No. EA-2019-0010.

A. As the Commission is aware (and as described in Mr. Mooney's Direct Testimony), the Company purchased the North Fork Ridge wind project on January 27, 2021, and on May 5, 2021, purchased the Kings Point and Neosho Ridge projects (collectively, the "Wind Projects"). All three Wind Projects are currently in operation and in service.

A map depicting the location of each of the Wind Projects is attached to my testimony as **Schedule SR-1**.

Q. Please provide some background on the North Fork Ridge Wind Project.

A. The North Fork Ridge Wind Project, which was constructed by Mortenson Construction, has a capacity of approximately 149.4 megawatts ("MW") and interconnects at Empire's substation at Asbury. The North Fork Ridge Wind Project consists of sixty-nine wind turbine generators and the infrastructure necessary for these generators to operate as an integrated energy production facility delivering energy to the transmission system. Each turbine consists of a foundation, tower, nacelle, hub, and blades. The nacelle contains a gearbox, generator, and transformer. There is an underground communications network, to allow monitoring and control of each turbine. There is also an underground collection network that takes the energy generated from each turbine to the project substation. The project substation consists of a large transformer, protective relays, electrical bus work, circuit breakers, and capacitor banks. An approximately 6.5-mile long 161 kilovolts ("kV") generation tie line carries energy from the project substation to the point of interconnection at Empire's Asbury substation. There is a satellite maintenance facility to supplement the existing Asbury maintenance shop, which serves all three wind facilities. Access roads have also been constructed to allow for maintenance.

Q. Please describe the Kings Point Wind Project.

A. The Kings Point Wind Project, also constructed by Mortenson Construction and with a capacity of approximately 149.4 MW, interconnects at the substation at Empire's La Russell Energy Center. The Kings Point Wind Project consists of sixty-nine wind turbine generators and the infrastructure necessary for these generators to operate as an

integrated energy production facility delivering energy to the transmission system. Each turbine consists of a foundation, tower, nacelle, hub, and blades. The nacelle contains a gearbox, generator, and transformer. There is an underground communications network to allow monitoring and control of each turbine. There is also an underground collection network that takes the energy generated from each turbine to the project substation. The project substation consists of a large transformer, protective relays, electrical buswork, circuit breakers, and capacitor banks. An approximately 15-mile 161 kV generation tie line has been constructed to carry energy from the project substation to the point of interconnection at Empire's La Russell Energy Center. There is also a satellite maintenance facility at Kings Point. This maintenance facility includes more warehouse space than the facility at North Fork Ridge due to the distance to the primary maintenance facility at the Asbury maintenance shop.

Q. Please describe the Neosho Ridge Wind Project.

A. Neosho Ridge, constructed by IEA Constructors, LLC, has a capacity of approximately 301.0 MW and interconnects to a new substation on Evergy Kansas Central, Inc.'s ("Evergy") Neosho-to-Caney River 345 kV transmission line. Neosho Ridge consists of 139 wind turbine generators and the infrastructure necessary for these generators to operate as an integrated energy production facility delivering energy to the transmission system. Each turbine consists of a foundation, tower, nacelle, hub, and blades. The nacelle contains a gearbox, generator, and transformer. There is an underground communications network to allow monitoring and control of each turbine. There is also an underground collection network that takes the energy generated from each turbine to the project substation. The project substation consists of two large transformers,

protective relays, electrical buswork, circuit breakers and reactive compensation devices. An approximately 8-mile 345 kV generation tie line was constructed to carry energy from the project substation to the point of interconnection on Evergy's Neosho-to-Caney River 345 kV transmission line. On November 17, 2020, Empire was granted a Transmission Rights Only Certificate of Public Convenience and Authority from the Kansas Corporation Commission (Docket No. 20-EPDE-503-COC) for this transmission line. Infrastructure to allow maintenance of the turbines was also constructed, consisting mainly of roads for ease of access and a maintenance building.

Q. How is Empire operating and maintaining the Wind Projects?

A. Empire monitors and operates the Wind Projects from an operations center located in the former Asbury Power Plant office building which is described in more detail in the Direct Testimony of Drew Landoll. The employees that perform this function were selected from among Empire's current employees, including those that previously worked at the Asbury generating station. Empire also maintains the balance of plant equipment for the Wind Projects, that is, everything other than the turbines. Due to warranty provisions, maintenance is performed by the turbine original equipment manufacturer ("OEM") under a service and maintenance agreement ("SMA"). **[redacted]**

Q. Since the Wind Projects were placed in service, how much energy have they generated?

A. The first turbine was synchronized to the grid in September 2020 at the North Fork Ridge project. Neosho Ridge was first synchronized in November 2020, followed by Kings Point in January 2021. To the end of April, the projects have generated 211,038 MWh; 251,934 MWh; and 102,823 MWh, respectively.

Q. How reliable have the Wind Projects been since they have been placed in service?

A. Empire has been tracking turbine availability since the time that each project declared commercial operation. This means that there currently is only a useful amount of data available for the North Fork Ridge facility. Since the commercial operation date, North Fork Ridge has had a technical availability of just under seventy-five percent. Availability has been primarily impacted by high wind cut-out events (when the turbine blades' pitch is adjusted to avoid damage from high wind speeds), curtailment for avoidance of potential wildlife damage (gray bat take), and regular maintenance. Availability has been improving as maintenance items are resolved and was over 90% in April. There are 12 turbines at North Fork Ridge that have availability below 90%, all of which are due to causes covered by warranty.

Q. What are the Company's plans for the continuation or restoration of safe and adequate service if there are significant, unplanned outages associated with the Neosho Ridge, North Fork Ridge and Kings Point Wind Projects?

A. Because Empire participates in the SPP IM, an outage at one or even all three of the projects would not typically result in service interruptions for the Company's customers. In fact, these projects can help bolster the reliability of the system as was demonstrated during the extreme cold weather event of mid-February 2021. During this event, all three wind farms, which are equipped for cold weather operation, were able to generate energy, enabling the Company to reduce the extent to which it had to

compete for natural gas (the prices of which rose to extreme levels) with other electric generation or home heating. The main factor influencing turbine availability during the event was the wind speed. Moreover, Empire has more than a century of experience in operating and maintaining electric generating facilities. This experience will be used as outage causes are diagnosed, safe and effective restoration measures are implemented, and root causes are identified to increase reliability. If it is determined that outages are caused by a manufacturing or construction defect, Empire will use all remedies available under the purchase and sale agreements for the Wind Projects or the Turbine Supply Agreements to resolve the problem.

III. THE WIND PROJECTS CCN ORDER

Q. Are you familiar with the CCN order?

A. Yes, I am very familiar with the CCN Order that was issued regarding the Wind Projects. Specifically, the CCN Order required that Empire comply with the following provisions, some of which are addressed in my testimony and others which are addressed by Company witnesses noted in the table below:

CCN Order Subject Matter	Company Witness
The Stipulation and Agreement Concerning Wildlife	Rooney
The Planned Ownership Structure and Associated Tax Equity Requirements	Mooney
Operation of the Wind Farms	Rooney
Independent Engineers Confirmation	Rooney
Satisfaction of In-Service Criteria	Rooney
Filing of Construction Reports and the Plans and Specifications	Rooney

for the Construction of the Wind Projects	
Filing of SPP Definitive Interconnection System Impact Studies	Rooney
Filing a Notice of Closing	Mooney
Rate Basing Wind Projects	Sanderson
Depreciation Rate Study	Watson
Rate Case Recommendations/Jurisdictional Cost Allocation	Sanderson/Emery
Non-Residential Access to Renewable Energy and Credits	Tillman
Market Price Protection Mechanism	Sanderson
Recording of Wind Project Revenues and Expenses	Sanderson

My testimony below addresses those provisions from the CCN Order for which I am responsible.

Q. Has the Company complied with the Stipulation and Agreement on Wildlife?

A. Yes. The Stipulation and Agreement Concerning Wildlife Issues in File No. EA-2019-0010 contained an Appendix A, which identifies the Wildlife Conditions. The Company has complied with all of these provisions, as amended. I would note that the Commission approved one change to the Stipulation and Agreement on Wildlife which was to remove the requirement of a traffic study. See Commission Order in File No. EA-2019-0010 on August 5, 2019.

Q. The CCN order required that before Empire purchases the wind holding companies that it obtains confirmation from an independent engineer that each Wind Project has achieved mechanical completion. Has that condition been met?

A. Yes. Empire contracted with Burns & McDonnell, an engineering firm employing professional engineers with extensive expertise in the development of wind generation facilities, to provide a written report confirming the each of the Wind Projects:

- has achieved mechanical completion and there is a reasonable likelihood that each Wind Project will satisfy the in-service criteria established by the CCN Order;
- has been placed in-service in a timely manner, and that a reasonable likelihood exists that the turbines will meet or exceed the guaranteed power curve for such turbines that is included in the turbine supply agreement.

On January 27, 2021, Empire received the independent engineer's report for the North Fork Ridge project and on May 4, 2021, it received the independent engineer's reports for the Kings Point and Neosho Ridge projects. All three reports are attached to my testimony as **Schedule SR-2**.

Q. The CCN order requires that each Wind Project must satisfy certain in-service criteria. How will the Company ensure that they are met?

A. The Company engaged Burns & McDonnell, which provided written confirmation to Empire that these criteria has been satisfied for each of the Wind Projects. A copy of these reports are attached to my testimony as **Schedule SR-3**.

Q. The CCN order required that the Company file quarterly progress reports on construction level plans and specifications for the project. Has the Company met this requirement?

A. Yes. Starting in July 2019, the Company began filing construction reports concerning the three Wind Projects. The Company initially filed quarterly reports but began filing monthly reports in November 2019 in order to provide the Commission and parties

with more timely information about the status of the projects. Monthly reports continue to be filed.

Q. The Company agreed to file the SPP Definitive Interconnection System Impact Study results for the Wind Projects. Is the Company in compliance with this provision?

A. Yes. On November 5, 2020, Empire submitted a Notice of Filing to the Commission with an October 29, 2020 Excel workbook representing DISIS Phase One Results issued by SPP. Pursuant to SPP's Generator Interconnection Procedures ("GIP"), the SPP Definitive Interconnection System Impact Study ("DISIS") includes two phases: (1) thermal and voltage analysis; and (2) stability analysis and refresh of thermal and voltage analysis for withdrawn applications. On April 7, 2021, SPP posted DISIS Phase Two results, which included some updated Phase One results based on comments received from interconnection customers at the completion of Phase One. On April 28, 2021, SPP posted updated results from Phase 2. A second Notice of Filing was submitted by Empire to the Commission on May 7, 2021, with the April 7 and April 28 DISIS issuances. Final results of the DISIS for North Fork Ridge and Kings Point are scheduled to be posted in September. Due to a significant number of withdrawals in DISIS-2016-02, SPP has announced that four geographic clusters – including the cluster containing Neosho Ridge – will be restudied. Final results for those clusters are scheduled to be posted in December 2021. Upon completion of the DISIS, a Facilities Study will then be conducted to provide study-level cost estimates for any new upgrades identified in the study.

IV. <u>OTHER GENERATION CAPITAL INVESTMENTS</u>

Q. What other capital investments has the company made to its generation fleet since the last rate case that it seeks to include in rate base?

A. The Company continually seeks to reinvest in its infrastructure to ensure that its generation facilities are capable of providing reliable and efficient service to customers. To this end, Empire makes capital investments to all its facilities every year. For this period, which began on February 1, 2020 and continues through June 30, 2021, Empire has invested just over $56.1 million in its existing generation facilities.

Q. Does this investment consist of only minor improvements and replacements at Empire's generation facilities?

A. No. While there are some small items that are included, there are several material projects that account for a significant portion of the total investment. $1.2 million was invested in warming and insulation of the steam turbine and related systems at the State Line Combined Cycle facility. These improvements will allow the unit to return to service more quickly following short shutdowns, which will make the unit responsive to a broader range of market conditions. Approximately $1.8 million was spent to replace an old fuel oil storage tank at Riverton. The new tank will require less maintenance than the decades-old tank it replaces, and it is smaller than the old tank due to the plant's diminished reliance on fuel oil. Approximately $3 million was invested in a spare engine and two spare power turbines for the aeroderivative units at the La Russell Energy Center. This investment will allow the units to return to service more quickly when one of these components fails or must be returned to the original manufacturer for service. $17.8 million was invested in upgrades to State Line Combined Cycle combustion turbine 2-2 at the end of its major inspection interval. The centerpiece of these upgrades is a new combustion turbine rotor, which promises to increase the maximum capability of the unit while improving fuel efficiency. The same upgrade is planned for combustion turbine 2-1 later in 2021. Finally, $3.5 million was

invested in the construction of the Prosperity Solar Farm. The Prosperity Solar Farm is a 2.2 MWdc photovoltaic solar energy conversion system built on an EPA Superfund site. Energy from this project is now available to customers under Empire's Solar Subscription Program.

V. ASBURY MARKET PERFORMANCE IMPROVEMENT ACTIVITIES

Q. Are you familiar with efforts to improve the Asbury Power Plant's market performance prior to the decision to retire the plant?

A. Yes, as I described in my professional background, I was employed in operations management at the Asbury Power Plant twice. In my next position held with Empire, I led the operations department at the plant. It was during this time that Empire and Asbury Power Plant management looked to improve Asbury's performance in the SPP IM.

Q. Why was it necessary to improve Asbury's market performance?

A. In short, because Empire transitioned its operation of Asbury to market signals, as opposed to self-committing it to serve baseload. If Asbury had continued to operate as it had previously, it would have continued to be outperformed by units with better heat rates, lower fuel costs, shorter start durations, shorter minimum downtimes, and faster ramp rates. This would lead to lower annual capacity factors and market revenues, increasing the cost of energy from the plant. Company Witness Aaron J. Doll further discusses Asbury and its participation in the SPP IM.

Q. Can you describe the changes made to improve the unit's market performance?

A. As stated previously, there are several factors that influence a unit's market performance. Because Empire continually seeks to improve unit heat rates, it was assumed that heat rate improvement would not be a component of this effort. Instead,

this effort would focus on shortening startup duration, decreasing minimum downtime, and decreasing minimum run time. In early 2018, Empire changed Asbury's Minimum Run Time from 96 hours to 48 hours. Additionally, plant personnel were able to successfully operate the plant with a new Minimum Down Time of 6 hours compared to its previous Minimum Down Time of 48 hours. These changes on Asbury's performance in the SPP IM is further explained in Company Witness Aaron J. Doll's Direct Testimony.

Q. How were these changes implemented?

A. Asbury's steam turbine was more flexible and capable of shorter start up times than were initially offered in the SPP IM; however, the turbine was limited by the capabilities of the boiler. By performing boiler tuning and programming changes to the plant controls, especially the burner management system, Empire was able to remove or reduce the boiler limitations. Of course, human performance would also be a major factor in the success of this program, so the changes were accompanied by additional operator training and the introduction of new standard operating procedures, especially for startup, shutdown, and layup.

Q. What was the effect on Asbury of these changes?

A. During its final two years of operation, Asbury experienced a record number of starts. Unfortunately, this record number of starts was not accompanied by an increase in net capacity factor. In fact, net capacity factor continued to decline. The increased number of starts also raised concerns regarding cycling.

Q. What is cycling?

A. Cycling of a thermal power plant refers to the transition from online status to offline status and back online, or vice versa. It can also refer to transitioning across a unit's load range, especially from minimum load to maximum load.

Q. Why is cycling concerning?

A. Increased cycling has been demonstrated to reduce mean time between failures in units designed and built for baseload operation, like Asbury. These impacts can be mitigated, but only through redesign and replacement of certain steam cycle components or through enhanced inspection and maintenance programs. These additional costs become increasingly difficult to justify for a unit with a net capacity factor that is diminishing.

Q. Does this conclude your Direct Testimony?

A. Yes.

VERIFICATION

I, Shaen T. Rooney, under penalty of perjury, on this 28th day of May, 2021, declare that the foregoing is true and correct to the best of my knowledge and belief.

/s/Shaen T. Rooney