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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. EA-2018-0202

DIRECT TESTIMONY

OF

MATT MICHELS

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a AMEREN MISSOURI

St. Louis, Missouri
May, 2018

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DIRECT TESTIMONY

OF

MATT MICHELS

FILE NO. EA-2018-0202

I. INTRODUCTION

Q. Please state your name and business address.

A. Matt Michels, One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

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

A. I work in Ameren Services Company's Innovation and Corporate Strategy Department as Director of Corporate Analysis. The Innovation and Corporate Strategy Department provides various corporate support services to Ameren Corporation and its subsidiaries, including Ameren Missouri.

Q. Please describe your professional background and qualifications.

A. I joined Ameren Services Company in 2005 as a Consulting Engineer in Corporate Planning. My responsibilities included coordination and monitoring of projects implemented in conjunction with the integration of processes and systems following the acquisition by Ameren Corporation of Illinois Power Company ("Illinois Power") in October 2004. I was subsequently involved in the integration of combustion turbine facilities acquired by Ameren Missouri in 2006. In September 2008, I was promoted to Managing Supervisor of Resource Planning with responsibility for long-range resource planning, including Ameren Missouri's Integrated Resource Plan ("IRP") filings and associated analysis. In February 2013, I was promoted to Corporate Analysis Manager, and in June 2017, I was promoted to my current

position. In that capacity, I continue to have direct responsibility for Ameren Missouri's resource planning process, including plans related to the acquisition of renewable energy resources.

I earned a Bachelor of Science degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in May 1990. I have been employed by Ameren or Illinois Power since June 1990 in various positions related to resource and business planning. During most of that time, my responsibilities have included the development, use and oversight of various planning models used for purposes such as production costing, acquisition evaluation, corporate restructuring, financial forecasting, and resource planning. I have previously testified before this Commission in proceedings involving resource planning, renewable energy standards compliance, and energy efficiency cost recovery.

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

A. The purpose of my direct testimony is to support the approval of Union Electric Company d/b/a Ameren Missouri's ("Ameren Missouri" or the "Company") application for a Certificate of Convenience and Necessity ("CCN") for the High Prairie Wind Project (the "Project"), which is being built so that Ameren Missouri can meet its compliance obligations under the Missouri Renewable Energy Standard ("RES").

Q. Please summarize the conclusions of your direct testimony.

A. Beginning in 2021, Ameren Missouri must have Renewable Energy Credits ("RECs") representing 15% of its retail sales in order to satisfy its RES obligations. Missouri wind resources are an attractive option for meeting this need. The proposed Project represents a significant portion of the portfolio of resources that are needed to comply with the RES in a cost-effective manner. For these reasons, the Missouri Public Service Commission ("Commission") should approve the Company's application for a CCN for the Project.

II. THE NEED FOR RENEWABLE RESOURCES

Q. Please briefly describe the Missouri RES and its requirements.

A. The RES was passed by Missouri voters via a ballot initiative in 2008. The RES requires that Missouri's investor-owned utilities acquire renewable resources equal to increasing percentages of their respective retail sales. As noted, the requirement reaches 15% of retail sales in 2021. The RES includes a 1.25 times multiplier for renewable energy generated within the state of Missouri to encourage in-state development of renewable resources so that 1 megawatt ("MW") of generation in Missouri results in 1.25 RECs for RES compliance purposes.

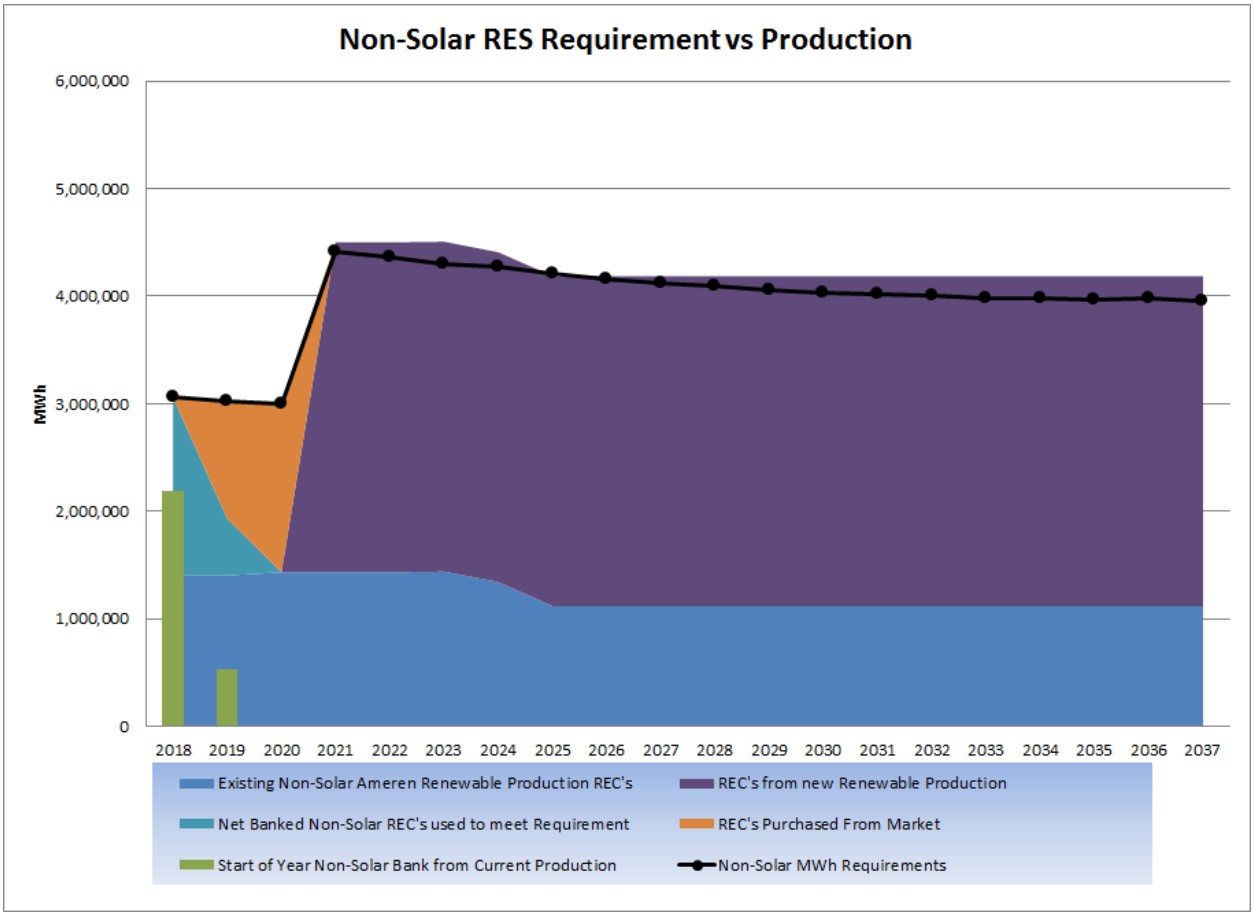
Q. What is Ameren Missouri's need for renewable resources starting in 2021?

A. To meet the 15% RES requirement, Ameren Missouri will need to retire approximately 4.5 million RECs each year.

Q. Does Ameren Missouri already have renewable resources that can be used to meet some or all of this need?

A. It has some of the resources it needs. Ameren Missouri owns renewable resources, including hydroelectric, solar, and landfill gas resources. Ameren Missouri also has a contract for 102 MW of wind energy from Horizon's Pioneer Prairie wind farm in northern Iowa. Together, these resources generate approximately 1.4 million RECs annually. This leaves a remaining need of approximately 3.1 million RECs in 2021. Figure 1 below was included in Ameren Missouri's 2017 IRP, which was filed with the Commission in September 2017. It shows the RES REC requirement by year, RECs generated from Ameren Missouri's existing renewable energy resources, and additional RECs that will be needed to meet the RES requirements.

Figure 1



Q. What is Ameren Missouri's plan for meeting its remaining need for non-solar RECs?

A. Ameren Missouri plans to meet its need for additional RECs through the construction and acquisition of 700-800 MW of new wind generation by the end of 2020.

Q. Does Ameren Missouri need the Project to satisfy any resource requirement other than the requirements of the RES?

A. No. Ameren Missouri has sufficient generation resources to meet its resource adequacy obligations under the MISO Module E tariff and to provide its customers with safe and reliable electric service at a reasonable cost. This is consistent with the analysis and findings in

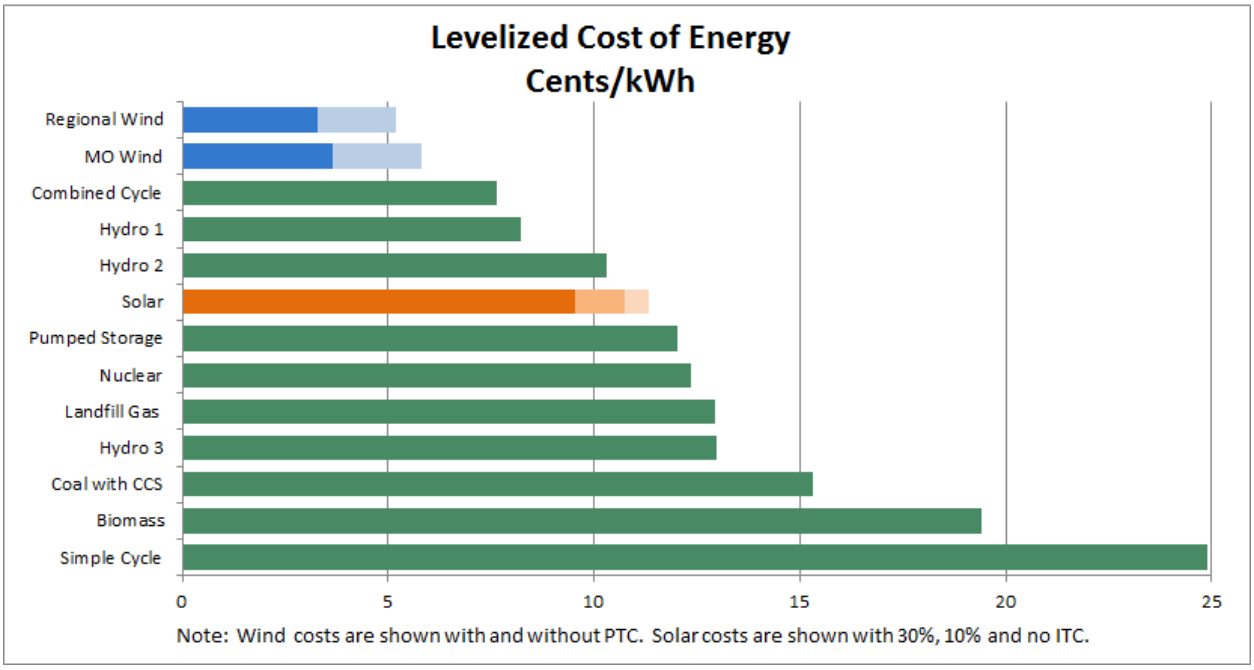
the Company's 2017 IRP. But for the need to comply with the RES, Ameren Missouri would not pursue the Project.

III. ECONOMICS OF WIND RESOURCES

Q. Has Ameren Missouri compared the economics of different types of renewable energy resources?

A. Yes. As part of our ongoing resource planning efforts, we evaluate the costs and operating characteristics of a number of viable renewable energy technologies. Our 2017 IRP includes a comparison of the costs of various electric generation technologies, including renewable energy technologies. Figure 2 below, also included in our 2017 IRP, shows the levelized cost of energy ("LCOE") for the primary technologies considered.

Figure 2



Q. What does the above chart demonstrate with respect to the cost of renewable energy technologies?

A. Based on the chart of LCOE above, wind resources are expected to be the lowest cost renewable energy resources, followed by hydroelectric, solar, landfill gas, and biomass resources.

Q. Why is it important to consider locational marginal prices ("LMPs") in addition to the LCOEs when comparing projects?

A. An understanding of both is necessary to assess the expected net benefit to customers. The LCOE only captures the expected costs of the project. Estimates for expected LMPs, along with prices for capacity, are needed to determine the expected benefits. It is entirely possible that a project with a lower-expected LCOE could result in net benefits to customers that are less than those that could be realized from a project with a higher-expected LCOE.

IV. PROJECT ECONOMICS – MODELING AND ASSUMPTIONS

Q. Have you analyzed the economics of the Project?

A. Yes.

Q. What kind of analysis have you performed?

A. I have evaluated the expected incremental net revenue requirements resulting from the Project once its benefits are accounted for. I have done so using a spreadsheet model to account for all the costs and benefits of the Project that would be reflected in the Company's jurisdictional electric revenue requirement for ratemaking.

Q. Please describe the basic operation of the spreadsheet model.

A. The model calculates the incremental net revenue requirement for the Project in each year based on a complete set of input assumptions. The total revenue requirement can be

considered as the sum of three basic components: 1) fixed asset costs, 2) operating costs, and 3) market revenues.

Fixed Asset Costs: The fixed asset costs are determined by calculating the return on net rate base in each year, the annual depreciation expense, and net tax expense, including the receipt of production tax credits ("PTCs"). The model applies separate tax depreciation to each of the major asset classes included in the Project investment – wind production, balance of plant, and transmission. Book depreciation is calculated using straight-line depreciation based on a 30-year asset life. Income taxes reflect the Company's combined state and federal tax rate based on the recently-enacted federal tax reform legislation. The combined income tax rate used for modeling is 25.45%. PTCs are determined by applying the expected federal PTC amount in dollars per megawatt-hour to the expected energy production of the Project.

Operating Costs: Operating costs are based on estimates for specific cost components. Turbine maintenance costs for the first five years of operation are based on quotes from Vestas, the manufacturer of the turbines to be used in the Project. Turbine maintenance costs for subsequent years are based on an escalation rate of 15% every five years. Maintenance costs for the balance of the wind farm, everything other than the turbines, is included separately, as are costs for ongoing monitoring of impacts on the Indiana bat population. Lease and royalty payments to property owners are based on agreements secured by Terra-Gen, the project developer. Property taxes are estimated by applying an assumed rate of 2.01% applied to the net plant balance of the Project, consistent with the state assessment applied to most other utility property. Finally, annual property insurance costs were estimated by Ameren Missouri's internal insurance experts.

Market Revenues: Market revenues include both energy revenues and capacity revenues. Energy revenues are determined by applying a range of power market price estimates to the expected energy production of the Project. The range of power market price estimates is taken from the Company's 2017 IRP analysis. Three scenarios from the IRP analysis have been evaluated in modeling the economics of the Project: 1) the probability-weighted-average ("PWA") power price of the 15 scenarios modeled in the IRP, 2) the lowest price scenario from among the 15 IRP scenarios, and 3) the highest price scenario from the IRP. The prices applied to the wind generation have been adjusted for basis differences, to reflect the LMPs at the location of the wind farm and the wind profile, to reflect the variability of the wind generation. Capacity revenues are determined by applying a range of capacity price estimates to the expected capacity credit for the wind generation. Three scenarios for capacity prices from the IRP analysis have been evaluated – reference, high, and low. For modeling, the low capacity price scenario has been coupled with the low power price scenario, the reference capacity price with the PWA power price and the high capacity price with the high power price. The expected capacity credit is determined by applying the MISO wind capacity credit value of 15.2% to the aggregate capacity output of the Project of 400 MW.

Q. Please describe the assumptions used for the modeling analysis.

A. The attached Schedule MRM-D1 provides a summary of the assumptions used for modeling the Project. Assumptions are shown for four different cases based on two different assumptions each for transmission network upgrade costs and net capacity factor. Schedule MRM-D2 provides the three scenarios for power market prices and capacity prices.

V. PROJECT ECONOMICS – ANALYSIS RESULTS

Q. Please summarize the results of your analysis of the Project.

A. Table 1 below shows a summary of the analysis results. It includes the net present value revenue requirement ("NPVRR") for each of the four cases under each of the three IRP power price scenarios.[1]

Table 1

	Base Transmission and Capacity Factor	High Transmission; Base Capacity Factor	Base Transmission; Low Capacity Factor	High Transmission; Low Capacity Factor
Net Present Value Rev. Req. ($MM)				
Low Price Scenario	(86)	18	(79)	25
PWA Price Scenario	(282)	(179)	(268)	(165)
High Price Scenario	(446)	(342)	(427)	(323)

Q. What do you conclude from the analysis results?

A. Based on the results of our analysis, the Project is expected to result in net benefits (represented by the negative NPVRRs) to customers in ten of twelve combinations of assumptions. In the case of high transmission costs and low power prices, which is the least favorable of the twelve scenarios, the NPVRR yields an increase in costs over the 30-year life of the Project of only $25 million, which averages less than $1 million per year. It is important to note that the value of the PTC is realized by customers during the first ten years of the project. This value is nearly $400 million over the first ten years, in nominal terms.

[1] "Base" transmission and capacity factor means our best estimate of the transmission-related costs and the capacity factor of the Project. "High" or "Low" transmission and capacity factor means our best estimate of the maximum/minimum transmission costs and maximum and minimum capacity factors. "PWA" means "probability weighted average," meaning we have assigned probabilities to each price scenario and calculated the weighted average.

Q. The NPVRR for the low capacity factor cases is similar to the NPVRR for the base capacity factor cases. That seems counter-intuitive. Please explain.

A. As Ameren Missouri witness, Ajay K. Arora, explains in his direct testimony, the contract with the developer includes a provision for a reduction in the purchase price if the capacity factor must be lowered to further mitigate bat impacts. This provision was intended to ensure we can achieve a similar NPVRR under either case.

Q. Have you evaluated the Project under the RES requirement of a maximum 1% impact on average rates over a ten-year period?

A. Yes. Based on the same model used for our recently filed 2018 RES Compliance Plan and adjusting the assumptions slightly to match those used for evaluating the Project, we expect the impact of RES compliance to remain well below the 1% limit. This includes the addition of further wind projects, in addition to this one, to achieve a wind portfolio to be acquired for RES compliance of 700-800 MW.

Q. Does this hold true even under the least favorable assumptions for transmission cost, capacity factor, and power prices?

A. Yes. With the least favorable assumptions applied to <u>all</u> wind projects – low power prices, high transmission costs, and low capacity factor – the impact on average customer rates over the 20-year IRP planning horizon is less than 0.7%. To bring the average rate impact up to the 1% limit would require one of the following: 1) a further increase in capital costs of approximately $200/kW, 2) a further reduction in power prices from the IRP low scenario of approximately another 18%, or 3) a reduction in capacity factor to 34%. Each of these conditions is very unlikely.

VI. CONCLUSION

Q. Please summarize your findings and conclusions.

A. Ameren Missouri has a need for approximately 700-800 MW of wind resources to meet its obligations under the Missouri RES in 2021. The Project represents the first competitive option that will be necessary for meeting this need. The Project is expected to result in net long-term savings to customers under most circumstances and to result in relatively-minor cost impacts, even when viewing it under the least favorable circumstances.

Q. What action do you recommend the Commission take in this case?

A. I recommend that the Commission grant the Company's request for a CCN for the construction of the High Prairie Wind Project to support Ameren Missouri's compliance with its obligations under the RES using Missouri renewable resources.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and a Certificate of Public Convenience and Necessity Authorizing it to Construct a Wind Generation Facility.	)))))	File No. EA-2018-0202

AFFIDAVIT OF MATT MICHELS

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

Matt Michels, being first duly sworn on his oath, states:

1. My name is Matt Michels. I work in the City of St. Louis, Missouri, and I am employed by Union Electric Company d/b/a Ameren Missouri as Director of Corporate Analysis.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Union Electric Company d/b/a Ameren Missouri consisting of 11 pages and Schedule(s) MRM-D1 and MRM-D2, 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.

MATT MICHELS

Subscribed and sworn to before me this 21st day of May, 2018.

Notary Public

My commission expires: March 7, 2021

CATHLEEN A DEHNE
Notary Public – Notary Seal
St. Louis City – State of Missouri
Commission Number 17119727
My Commission Expires Mar 7, 2021