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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. EA-2023-0286

DIRECT TESTIMONY

OF

AJAY K. ARORA

ON

BEHALF OF

UNION ELECTRIC COMPANY

D/B/A AMEREN MISSOURI

St. Louis, Missouri
June, 2023

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DIRECT TESTIMONY

OF

AJAY K. ARORA

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I. INTRODUCTION

Q. Please state your name and business address.

A. Ajay K. Arora, Union Electric Company d/b/a Ameren Missouri ("Ameren Missouri" or "Company"), One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. What is your position with Ameren Missouri?

A. I am a Senior Vice President and the Chief Renewable Development Officer for Ameren Missouri.

Q. Please describe your educational background and employment experience.

A. I received my Bachelor of Science Degree in Chemical Engineering from Panjab University (India) in May 1992. I received my Master of Business Administration degree from Tulane University in May 1998. I joined former Ameren Corporation subsidiary, Ameren Energy, in June 1998 and held trading and structuring positions in Ameren Energy before supervising the group that priced structured energy products for former Ameren Corporation subsidiary Ameren Energy Marketing Company's wholesale and retail customers from 2002 to 2004. From 2004 to 2007, I was responsible for the analytical group supporting Ameren Missouri's transition into the Midwest Independent

Transmission System Operator, Inc. ("MISO"), including reviewing specific market design issues in MISO.[1] In 2007, I led the Ameren Missouri Regional Transmission Organization cost-benefit study that was filed with the Missouri Public Service Commission ("Commission") in File No. EO-2008-0134, and I assumed responsibility for the Quantitative Analysis, Integrated Resource Planning, Load Analysis, and Operations Analysis groups. In January 2008, as part of my role as Director of Corporate Planning, I assumed the additional responsibility for the Asset and Trading Optimization group supporting Ameren Missouri. In November 2011, I assumed additional responsibilities for the corporate Project Management Oversight and Market Risk Management groups. These groups oversee large utility capital projects and commodity risk management. In November 2014, I assumed responsibility for the Environmental Services department as Vice President of Environmental Services and Generation Resource Planning. The Environmental Services department develops environmental policy and provides environmental compliance support, which includes the areas of energy delivery, generation, and transmission. In March 2018, I assumed leadership responsibility for Ameren Missouri's entire non-nuclear generation operations and energy management function as Vice President of Power Operations and Energy Management. I assumed my current position as Chief Renewable Development Officer in late 2020. I continue to serve as the Chief Renewable Development Officer and was promoted to Senior Vice-President in 2022.

[1] MISO is now known as the Midcontinent Independent System Operator, Inc.

II. PURPOSE OF TESTIMONY AND SUMMARY

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

A. The purpose of my direct testimony is to support the Company's application for Certificates of Convenience and Necessity ("CCN") for four solar generation facilities (individually, a "Project" and collectively, the "Solar Projects") that will support the Company's critical need to transition its generation fleet to one consisting of a greater proportion of clean energy resources – operating alongside new natural gas-fired combined cycle generation – to replace the energy currently provided by the Company's aging coal-fired generation fleet. The need for this transition was most recently outlined in, and is supported by, the documents submitted with the Company's June 22, 2022, Notice of Change in Preferred Resource Plan (the "2022 Preferred Resource Plan").[2] The Commission itself recognized the need in its recent *Report and Order* approving a CCN for the Boomtown Solar Project in File No. EA-2022-0245.[3] The Solar Projects at issue in this docket – Split Rail Solar, Cass County Solar, Vandalia Solar, and Bowling Green Solar –will further support Ameren Missouri's generation transition efforts.

Q. Please summarize the key conclusions in your testimony.

A. The Company's 2022 Preferred Resource Plan reflects the fact that Ameren Missouri's coal-fired generation is approaching and will reach the end of its useful life over the next twenty years. Three of the Company's four coal facilities will have retired no later than 2030. One baseload coal plant, the Meramec Energy Center, retired at the end of 2022 and another, the Rush Island Energy Center, will be retired by 2025. Another baseload

[2] Submitted in File No. EO-2022-0362 and attached to Matt Michels' Direct testimony as Schedule MM-D2.
[3] E.g., *Report and Order*, File No. EA-2022-0245, pp. 27-28.

coal plant, the Sioux Energy Center, is expected to be retired by 2030. As Company witness Matt Michels' Direct Testimony discusses, this fact, coupled with shorter lives for gas peaking capacity located in Illinois,[4] creates a clear need for the Company to begin to transition to the least-cost mix of generation resources now – and to sustain that transition consistently over time – to replace the energy being lost by retired generation and ensure a reliable and resilient energy supply for its customers.

New renewable generation is the most affordable energy resource to replace retiring coal-fired generation plants. Transitioning to new renewable generation resources also mitigates several risks, including the ever-increasing risk of significant carbon regulation that could further increase costs, reduce coal-fired generation, or accelerate the retirement dates of the Company's remaining coal-fired generation. Transitioning also helps achieve the environmental benefits widely recognized as being associated with the decarbonization policies that give rise to the potential for greater regulation of (and less energy from) coal-fired resources and supports the state's policy objective to diversify Missouri's energy supply using renewable energy resources.

Adding the Solar Projects, which will go into service from 2024-2026, is a continuation of the controlled but sustained transition approach the Company outlined in the 2022 Preferred Resource Plan, which will begin in earnest with the approved additions of the Boomtown Solar and Huck Finn Solar projects in 2024. Steadily adding renewable energy resources over time is a responsible approach because it ensures a reliable energy supply for our customers while reducing carbon emissions sooner. Continuing the controlled and sustained transition also mitigates myriad renewable project implementation

[4] Driven by the Illinois Clean Energy Jobs Act

risks, which are varied and significant, as discussed in my testimonies in File No. EA-2022-0245 and below, and as also addressed by Company witness Scott Wibbenmeyer in his Direct Testimony in this case. Pursuing renewable energy projects and continuing to pursue them in the near-to intermediate-term also enhances the affordability of these needed resources because of the significant federal tax credits available for these projects. Any plan that delays investment in new renewable generation would be irresponsible because it places the future reliability, resiliency, and affordability of our customers' energy supply at risk, while delaying environmental benefits as well.

III. THE NEED FOR RENEWABLE RESOURCES

Q. The Company submitted a new Preferred Resource Plan on June 22, 2022, which reflects the Company's need to transition to greater reliance on renewable energy resources, and away from coal, over the planning horizon. Why was that Preferred Resource Plan selected?

A. The Preferred Resource Plan in the Company's 2022 Integrated Resource Plan ("IRP") filing reflects a need for a controlled but sustained transition to greater reliance on renewable energy resources, of which the Solar Projects proposed in this docket are a part, for the following reasons:[5]

1. **Aging Coal Fleet -** Ameren Missouri will need energy as well as capacity resources to meet customer demand and reserve margin requirements as its coal-fired generators are retired at the end of their useful lives. That need is also driven by the risk of reduced output from coal-fired generation due to existing or proposed environmental requirements or other causes even before the coal units retire. Due primarily to recent and expected coal unit retirements and these other risks, Ameren Missouri has a clear, present, and ongoing need to add energy resources to its generation portfolio to address the dramatic shift in the Company's energy position

[5] Company witness Michels' Direct Testimony primarily addresses the first three of the six reasons above for the selection of the 2022 Preferred Resource Plan, and I will primarily address the last three of these six reasons in my testimony below.

that will occur over the next several years and continue over the next twenty years. Ameren Missouri expects to experience an energy shortage as early as 2028 assuming normal loads and generation, a dramatic change from the approximately 15-20% energy buffer from which customers have historically benefited.[6] Such a shift could expose our customers to reliability challenges and high market price risk.

2. **Least Cost, Emission-Free Energy** - Renewable resources represent the lowest cost as well as emission-free sources of replacement energy.[7]

3. **Increasing Environmental Regulations** - As noted in my discussion of reason 1, the large-scale expansion of renewable resources provides significant risk mitigation to Ameren Missouri's portfolio, particularly with respect to additional environmental regulations that could become law, other changes in climate policy and carbon dioxide ("CO_2") prices, and other factors that may significantly affect the operating costs and benefits of its existing coal-fired resources. We are actually seeing these risks come to fruition now with the effectiveness of new rules regulating emissions of nitrous oxides ("NO_x"), plus additional proposed regulations targeted specifically at CO_2, among others.[8]

4. **Reliability and Resilience** - Ameren Missouri's addition of diverse new renewable resources during continued operation of its existing fleet is a prudent approach and ensures reliable, resilient, and affordable energy for our customers under varying scenarios during the transition.[9]

5. **The Risk of Inaction** – Delaying the inevitable shift to renewables creates significant implementation risk. The transition will require a very large-scale expansion of renewable generation at the same time that other utilities and states are pursuing the same. A task of this magnitude must be implemented over time to be successful. This is the case since each renewable energy project takes 5 to 8 years to develop and construct, requires geographical diversity of projects for reliability, and requires navigating several implementation risks, such as delays in

[6] Future conditions are expected to differ significantly from historical conditions and may warrant a greater buffer. Such future conditions include reduced length from dispatchable resources and a greater reliance on intermittent renewable resources within the Midcontinent Independent System Operator's ("MISO") footprint.
[7] File No. EA-2022-0245, *Report and Order*, p. 29, Issued April 12, 2023 ("Renewable Generation is the most affordable energy resource to replace coal-fired generation plants").
[8] *Id.*, p. 17 (Recognizing the "significant risk mitigation" a "large-scale expansion of renewable resources" provides).
[9] *Id.*, p. 29 (The Commission recognizing that Ameren Missouri should add renewable energy resources to mitigate the risk of not being able to meet load at peak times, and to mitigate the inability to always rely on MISO as a low-cost source of energy to meet peak loads).

the development or completion of projects, lost opportunities for more viable projects, and the potential for financing constraints and increases in financing costs.[10]

6. **Availability of Significant Tax Credits** - Initiating renewable resource builds in the nearer term provides the ability to realize significant tax incentives for customers and thus lower the overall cost of adding needed renewables, making addition of these necessary resources more affordable for all customers. Because federal law and policy can change, taking advantage of such incentives sooner and while the better projects are available provides greater certainty of benefits to customers.[11]

The need to transition has yet again gained further urgency since the 2022 Preferred Resource Plan was filed. Although MISO's recently released 2023-2024 Planning Resource Auction results indicate that the North/Central region is expected to have adequate capacity to meet the Planning Reserve Margin for this planning year, MISO was careful to clarify that many of the actions taken to ensure adequate capacity for 2023-2024 are not repeatable, and do not reflect a "fix" for all long-term capacity concerns in the region,[12] which were an underlying cause of spiking capacity prices resulting from the 2022-2023 Planning Reserve Auction that cleared at MISO's $236/MW-Day estimate of the Cost of New Entry. Similarly, the North American Electric Reliability Corporation's ("NERC") 2023 Summer Reliability Assessment suggests that although the risk of meeting load in MISO is somewhat reduced for summer 2023, MISO "is at risk of operating reserve shortfalls during periods of high demand or low resource output."[13] Over the next few

[10] *Id.*, p. 28 (The Commission recognizing the practical reality that Ameren Missouri must proceed with the transition and sustain it given the challenges of implementing the renewable energy resources Ameren Missouri needs); see also p. 30, where the Commission recognized that adding renewable resources could avoid later having to deploy less favorable resources due to unavailability of tax credits, transmission constraints, or higher financing costs.
[11] *Id.*, pp. 29- 30 (The Commission recognizing that tax credits are available now that may not be available later and recognizing the risk of higher future financing costs).
[12] Cite MISO 2023-2024 PRA results (attached as Schedule MM-D7 to Michels' Direct Testimony).
[13] Cite NERC 2023 Summer Reliability Assessment (attached as Schedule MM-D9 to Michels' Direct Testimony).

years, summer capacity in MISO continues to be constrained.[14] In addition, recent updates to the EPA's Cross-State Air Pollution (CSAPR) guidelines and proposed EPA Clean Air Act modifications further limit operations for Ameren Missouri's coal and gas facilities. Company witness Michels' Direct Testimony discusses these policy developments from the EPA in greater detail.

Ultimately the 2022 Preferred Resource Plan was selected because a controlled but sustained transition to renewable energy is more cost-effective and practical than attempting to perfectly time additions to coincide with a projected capacity shortfall and ensures the Company can continue to deliver sufficient quantities of reliable, affordable energy to customers, while meeting many of those customers' expectations for that energy to be ever cleaner. It does this through a combination of staged renewable resource additions, coal-fired resource retirements, and new dispatchable generation and battery storage additions.

Q. Has the Company quantified the benefits to customers of a sustained and well-planned transition to new energy resources versus adding new generation only at the point in time when it needs capacity to meet a planning reserve margin?

A. Yes. Company witness Michels addresses the quantification in detail in his direct testimony. In summary, before selecting the 2022 Preferred Resource Plan, the Company examined various alternatives, including focusing on two plans labeled by Company witness Michels' Direct Testimony as a Renewables for Capacity Need Plan and a Renewable Transition Plan. The latter reflects a controlled, sustained transition to clean energy versus the former, which only adds renewable generation when the Company has

[14] See NERC's 2022 Long-Term Reliability Assessment (p. 14) attached as Schedule MM-D12 to witness Michels' direct testimony.

an imminent need for additional capacity. In addition to the fact that adding capacity only in very close proximity to the moment it is needed would be infeasible from an implementation perspective, as I address later in my direct testimony, the comparison of the two plans at that time showed that the Renewable Transition plan's net present value of revenue requirement ("NPVRR") is $632 million[15] less, and results in lower risk to customers, than the Renewables for Capacity Need plan. After updating those plans in 2023 to include the impacts of the Inflation Reduction Act – both new tax incentives available, and increased resource cost expectations due to higher demand for renewable energy projects – the Renewable Transition plan now indicates even more savings for customers as compared to the Capacity Need Plan with a difference in net present value of revenue requirement of over $1.2 billion, meaning the implementation of the PRP is expected to cost our customers more than $1.2 billion *less* than following a more academic approach of only adding capacity when imminently needed and only to meet a capacity (as opposed to an energy) need.

Q. As you contemplate the various reasons that led the Company to select the 2022 Preferred Resource Plan, are there additional factors that indicate that a transition to renewable generation sources is in the best interest of Ameren Missouri customers?

A. It is becoming increasingly clear for a variety of reasons that it is necessary to transition the Company's generation fleet towards cleaner generation resources. We recognize that replacing the existing, primarily fossil fuel-based generation fleet with a largely renewable fleet is a significant transformation that will fundamentally change the

[15] On a net present value basis over the next 20 years in the probability weighted average case.

way we operate, and the way we serve our customers. But the Company is undertaking this transition because it is clearly in the best interest of our customers, our investors, and the communities we serve. First, we know that the existing fleet is aging and will need to be replaced within our planning horizon. New solar and wind generation projects present the least cost technologies to provide replacement energy for our customers to fill in the gap created by retiring fossil generation. We also know that there is in fact, increasing demand from many of our customers and our investors for this transition to take place to achieve environmental and sustainability goals. And these customers and investors are eager for the transition to progress now, to support the decarbonization of the economy as a whole. Typically, in the regulatory setting, the interests of customers and investors can have elements that, at least on the surface, appear to conflict. But where there is a significant level of obvious alignment of interest between our customer and investor populations, as there is here in their recognition of the benefits of cleaner generation resources, the public interest is clearly served by advancing that interest. As noted earlier, transitioning now rather than waiting results in significantly lower present value of revenue requirements for all customers.

The Company is not alone in observing, and responding to, these forces. Utilities and states across the country are adopting goals and policies to transition toward renewables, decarbonize their generation fleets, and increase the sustainability of their operations. This dynamic of utilities and states all trying to transition their fleets at the same time, competing for the same renewable sites, and the same capital, makes it all the more urgent to sustain the transition, as I will discuss below. Anyone that closely monitors developments, trends, and sentiments related to the energy industry clearly understands

that the decarbonization of the energy system, largely through a transition to renewables, is inevitable, and it is happening. The question is not whether we should transition, but how the transition can best be achieved to maximize the benefits, including reliability, economic and environmental benefits for customers.

IV. RELIABIITY AND RESILIENCY OF ENERGY SUPPLY

Q. The Company's plan to transition to the new fleet, featuring renewable and low-carbon resources, reflects some meaningful operating overlap with the old fleet resources, comprised of primarily coal-fired resources. Why is that important to ensure reliability?[16]

A. To put it simply, there are reliability risks during the transition period between the old fleet coming offline, and the new fleet being fully implemented. These risks are driven by myriad planning uncertainties, such as:

- Uncertainty in system load, including as industry and transportation electrify, and also driven by more frequent and intense severe weather;
- Uncertainty in the energy or demand savings, or both, from planned energy efficiency and demand-response programs, which could meaningfully change both our capacity and energy positions;
- Uncertainty in whether and to what extent Ameren Missouri can expect to (or should) rely on the MISO market;
- Uncertainty in the reliability contribution of new renewable resources;
- Ever increasing environmental regulations for existing fossil generation;

[16] Company witness Michels' explains what we mean when we refer to the "old fleet" and "new fleet" in his Direct Testimony.

- Unplanned generation outages or other unanticipated events; and
- Material variances between our optimized generation forecasts or weather-normalized loads used for planning purposes and what happens in reality.

Taken as a whole, it is imprudent, unwise, and in my opinion, reckless to wait until some predetermined amount of capacity of coal-fired generation retires to add corresponding capacity of renewables to plug the capacity gap, or to wait until that coal capacity can no longer provide any energy. Ameren Missouri needs to preserve system reliability while executing the transition to the new fleet and transitioning in a sustained manner over time – starting now – as the Company has proposed in its Preferred Resource Plan.

Q. If coal-fired energy is providing the reliability for meeting the energy needs of Ameren Missouri customers, why not continue to run the Company's coal plants instead of adding new renewable generation?

A. While in theory Ameren Missouri could continue to invest capital in and provide greater maintenance for coal-fired generation to extend its life beyond what is typically expected, experience across the country demonstrates that coal-fired plants (like any mechanical apparatus) cannot cost-effectively and safely live forever. While these coal-fired resources have served as the backbone of Ameren Missouri's generation fleet and ensured reliability, these plants are now aging, with increasing maintenance challenges for key equipment (such as high energy piping, boilers and turbines). By the time the last of our coal units retire, as outlined in the current Preferred Resource Plan, that unit will be almost 70 years old and is already about 50 years old today. When Sioux retires by 2030, it will be more than 60 years old. Coal units are also under increasing pressures from environmental regulations, such as the Good Neighbor Rule discussed by Company

witness Michels, and the recently announced EPA regulations on existing coal-fired generation that were proposed by EPA last month, which if implemented impose more costs on the units and lower their generation. The simple fact is that the cost per megawatt-hour ("MWh") for generation from coal-fired units will likely continue to increase over time due to increases in operations and ongoing maintenance costs, until reaching a point where the generation is no longer economically viable. In addition, the recently adopted new regulations will, and future regulations could, continue to increase the cost of operating coal plants and reduce their output, independent of the aging of the equipment. Conversely, new renewable energy resources are a cost-effective means to meet our energy needs, and current and future environmental and climate policy changes are likely to continue to make renewable energy even more affordable as compared to aging coal plants. In summary, replacing coal-fired energy with renewable energy and other low emitting and dispatchable resources is a cost-effective solution that also mitigates the financial risk of additional environmental regulations and the aging of the Company's existing coal-fired generation.

Q. Please discuss the Company's need for energy resources and how the Solar Projects help fulfill that need.

A. As discussed above, Ameren Missouri's coal facilities are reaching end of life, and three of the Company's four coal facilities will retire no later than 2030: the Meramec Energy Center retired at the end of 2022, the Rush Island Energy Center will retire by 2025, and the Sioux Energy Center will retire by 2030. As illustrated in Company witness Michels' Direct Testimony, these retirements are triggering a dramatic swing in the Company's energy position over the next few years, from its current and historical

abundantly long position to having a shortage of energy starting in 2028 assuming normal generation and load. The shortage grows steadily thereafter.

Specifically, even under normalized planning conditions, Ameren Missouri becomes short by approximately 1 million megawatt-hours ("MWhs")[17] as early as 2028, by approximately 2 million MWhs by 2029, approximately 6 million by 2031 and approximately 14 million MWhs by 2037, if no new generation resources are added.[18] In fact, the Company's supply of energy is barely above its needs even as early as 2026 and woefully below the energy buffer the Company has maintained historically to protect our customers from shortages in energy supply and/or exposure to market price spikes. Energy shortages in 2028 and 2029 could be increased by an additional 3 million MWhs with recognition of a high price on carbon emissions, which would also mean there is no excess energy at all by 2026.[19] The renewable energy resources the Company plans to add through 2030 reduces this shortage.

I should note that the Company's energy positions just discussed above are probably even tighter given that they do not yet account for the lower generation likely to result from the recent CSAPR modifications mentioned above.

Q. Historically, how many annual MWhs have the Company's customers benefited from as an energy buffer?

A. Over the last five years, the Company's customers have benefited from an annual energy buffer of approximately 5 million MWhs.[20] This energy buffer has mitigated

[17] 1 TWh.
[18] See Matt Michels' Direct Testimony, Figure 5 Energy Position: No New Non-RES Resources.
[19] See Matt Michels' Direct Testimony, Figure 6 Energy Position: RES Only Plus CC in 2031 (High Carbon Prices).
[20] As Michels' Direct Testimony indicates, there have been times in the past when the Company's energy buffer was around 10 million MWhs.

the risk that the Company's customers face from reliability related emergency conditions resulting in energy shortages on the electric system. The buffer over the past roughly 5 years translates to an energy position approximately 15-20% above our retail customers' needs, which mitigates customers from the risk of adverse MISO reliability and market conditions as well as price spikes (price risk), while generating meaningful excess market revenues for the benefit of customers.

Q. Should the Company continue to maintain an energy buffer?

A. Yes, in my opinion it should do so to address those same reliability and price risks and to address uncertainties under various market conditions – for example under high carbon and high load scenarios.[21] Another benefit of the Preferred Resource Plan is that it mitigates the risk of energy shortfalls in the case of unexpected extended outages at Labadie, or lower generation output from Labadie due to more frequent outages as the units age or as a result of more stringent future environmental regulations. Without adding energy resources now and into the future, the Company is in a very tight energy position and is expected to be short energy within the next 4-5 years under normal planning assumptions and possibly even as early as 2026. And several renewable projects will be needed to fill the gap. The Company needs to add the resources proposed in this docket plus additional new wind and solar by 2030 to provide the reliability and affordability that our customers have enjoyed historically.

[21] See Matt Michels Direct Testimony Figure 10, Renewable Transition (High Carbon Prices), and Figure 13, Renewable Transition (High Carbon/Load).

Q. How many MWhs of new renewable energy does the Company plan to add from 2024 to 2030 in its 2022 IRP Preferred Resource Plan?

A. The Company plans to add approximately 7.5 million MWhs of new renewable energy by 2030 through a combination of new solar and wind projects, which will help both replace lost energy from retiring fossil facilities and ensure the Company maintains a reasonable energy buffer. The Solar Projects that the Company is seeking CCNs for in this case are estimated to add approximately 16-17% (about 1.2 million MWhs annually) of the additional 7.5 million MWhs of new renewable energy to be added by 2030. Wrapping around this 7.5 million MWhs of additional renewable energy will be energy provided by the planned combined cycle natural gas plant, which is expected to put the Company above the desired energy buffer for a few years until additional coal-fired capacity retires later in the decade.

Q. Could you please describe all the renewable projects that comprise the Company's planned addition of 7.5 million MWhs of renewable energy from 2024 to 2030?

A. Table 1 below outlines all the major new renewable energy projects currently planned to be added by the Company by 2030 that add up to approximately 7.5 million MWhs annually.

Table 1. 2024-2030 AMO Planned Renewable Energy Additions

Project(s)	Estimated Annual MWhs	% Of Planned Renewable Energy Additions	Planned Completion Year
Huck Finn Solar (200 MW); Boomtown Solar (150 MW)	800,000	10-11%	2024
Solar Projects in this CCN Case (550 MW)[22]	1,200,000	16-17%	Cass County: 2024 Vandalia: 2025 Bowling Green: 2026 Split Rail: 2026
1000 MW Wind Resource Additions[23]	3,500,000	46-47%	2028
900 MW Solar Resource Additions[23]	2,000,000	26-28%	2027 to 2030

Q. If Ameren Missouri has a need for energy in 2028, why can't the Company wait until 2028 to build new energy resources?

A. For a variety of reasons, simply waiting until the last minute to add energy resources is not a prudent approach. First, our planning positions are based on normal conditions, but reality will of course play out differently. If, due to operational or environmental risks that impact the dispatch of our fossil generation or other conditions that affect our loads, the Company's energy shortage occurs even sooner than 2028, the Solar Projects will already be able to provide much needed energy for our customers throughout the year. As a result of the time it takes to complete procurement and construction activities, the majority of the capacity reflected by the Solar Projects in this CCN case are already planned to be completed several years after this filing, in 2026, in order to meet energy needs arising shortly thereafter.

[22] Split Rail Solar (300 MW), Cass County Solar (150 MW), Vandalia Solar (50 MW), and Bowling Green Solar (50 MW).
[23] Specific projects still under development and/or negotiation.

Second, even if operational or environmental risks do not accelerate the energy need prior to 2028, the energy shortage in 2028 could be much higher than in the Company's base planning case. Under just one planning scenario the Company assessed – a high carbon price[24] – the expected energy shortage in 2028 increases by approximately 3 million megawatt-hours, which equates to an additional 1,400 MW of solar projects beyond those called for by the Company's PRP. But numerous other system conditions could trigger a similar increase – for example, increased load due to economic activity in the region, or constraints on the Company's ability to achieve cost-effective energy efficiency savings.[25]

Third, there are numerous challenges to the development and construction of renewable energy projects, with good projects becoming increasingly difficult to implement. Company witness Scott Wibbenmeyer's Direct Testimony discusses that despite issuing multiple RFPs that produced numerous candidate projects, the number of viable projects is much less. With nearly 2,000 MW of additional renewable energy project capacity needed by 2030 *beyond* the projects already identified by the Company, it is vitally important to implement advanced-stage renewable projects like the Solar Projects as and when they are available.

All of these uncertainties – the potential for an energy shortage sooner, a larger shortage in 2028, and the numerous implementation risks facing renewable project development – drive the need to continue the Company's feasible, sustained implementation plan as the Company executes its transition to renewable energy resources.

[24] See Matt Michels' Direct Testimony, Figure 9, Energy Position: RES Only Plus CC In 2031 (High Carbon Prices).
[25] Historically the Company has only achieved 80% of the realistic achievable potential ("RAP") for these programs, but the Company's base energy and capacity positions assume 100% of RAP is achieved.

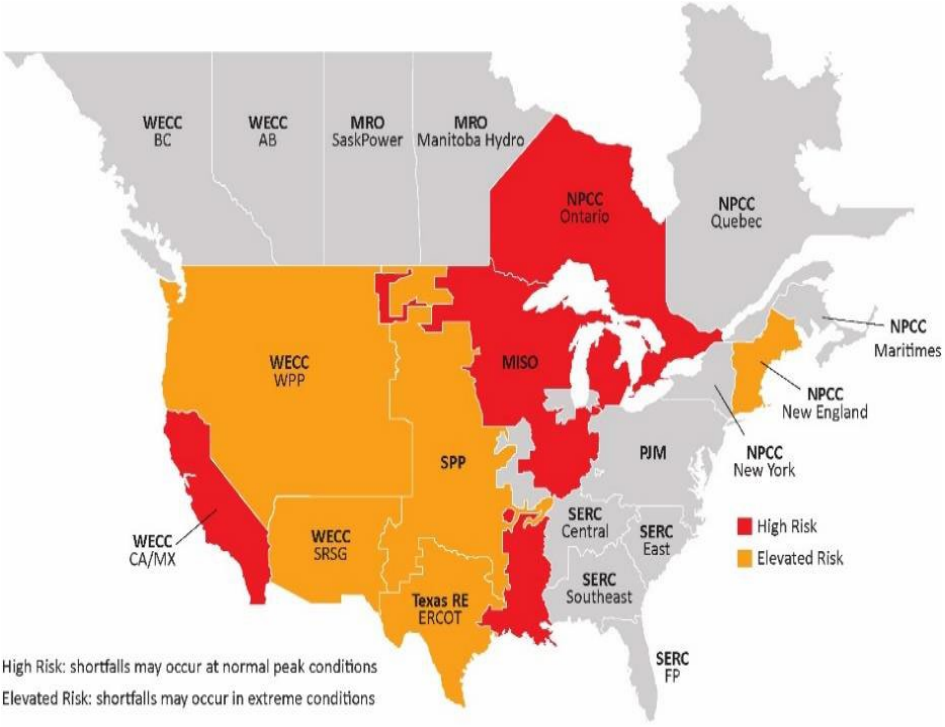
We firmly believe that this is the only prudent approach to protecting the reliability and affordability that our customers expect.

Q. Is that the only prudent approach, or could Ameren Missouri just lean on the MISO market more heavily to meet its near-term energy needs?

A. It would not be prudent to rely on the MISO market more heavily for near-term energy needs. Just like Ameren Missouri, the entire MISO footprint is undergoing a transition from dispatchable fossil resources to a much greater reliance on renewable resources; in fact, MISO's modeling indicates that MISO as a whole is expected to move at a faster pace than Ameren Missouri. Therefore, it has become riskier to rely on the MISO market in moments of system stress than it has been in the past. As detailed in the North American Reliability Corporation's ("NERC's") 2022 Long-Term Reliability Assessment, published just a few months ago, MISO's anticipated capacity reserves are alarmingly low and energy risks are expected to increase starting in 2024, especially in June through August when MISO's demand peaks.[26] The NERC report lists MISO as a "high risk" region of the country in terms of resource adequacy, defined as an area that does not meet resource adequacy criteria, such as the 1-day-in-10 year load loss metric, during periods of the assessment horizon. Figure 1, below, highlights the regions considered high or elevated risk.

[26] See page 9 of the NERC report attached to Matt Michels' Direct Testimony as Schedule MM-D12.

Figure 1. NERC Risk Area Summary, 2023-2027[27]



MISO's "high risk" status indicates that without a concerted effort to begin and sustain our plan to add replacement energy resources, Ameren Missouri and MISO will both be "skating on the edge" from an energy and capacity perspective, putting customer reliability and affordability at risk. As discussed above, although MISO's recently released 2023-2024 Planning Resource Auction results indicate that the North/Central region is expected to have adequate capacity to meet the Planning Reserve Margin this coming year, those results do not reflect a "fix" for all long term capacity concerns.[28] And similarly, NERC's 2023 Summer Reliability Assessment suggests that although the risk of meeting

[27] *Id.*, p. 6
[28] MISO 2023-2024 PRA results (attached to Michels' Direct Testimony as Schedule MM-D7).

load in MISO is reduced for summer 2023 as compared to 2022, MISO "is at risk of operating reserve shortfalls during periods of high demand or low resource output."[29]

Q. Has the Company assessed the seasonal and hourly reliability contributions of new solar resources?

A. Yes. Company witness Matt Michels discusses how solar projects increase the reliability of the Company's energy supply by season. Specifically, these solar projects enhance reliability in the summer season but since solar generation is produced all year round, the projects benefit energy supply in all seasons, to varying levels. However, providing reliable service also depends on having a reliable source of power during every hour of every day, especially in periods of extreme weather, which we can all see are occurring with greater frequency and intensity. Company witness Michels direct testimony also includes a summary of hourly reliability modeling completed using the probabilistic modeling tool SERVM. This industry-leading tool assesses Loss of Load Events ("LOLE") – a metric commonly used to measure system reliability – using historical weather years to predict how both system resources and load will perform on an hourly basis. The modeling results Company witness Michels presents indicate that in two sample years 2026 and again in 2031, the planned renewable additions in the Company's 2022 Preferred Resource Plan improve reliability on an hourly basis and reduce LOLE.

Company witness Michels also presents several illustrative charts which show that across multiple seasons solar resource output is well aligned with the Company's load profile. Across many peak hours solar makes a strong contribution to meeting customer

[29] NERC 2023 Summer Reliability Assessment (attached to Company witness Michels' Direct Testimony as Schedule MM-D9)

energy needs and works well to complement other generation resources planned for Ameren Missouri's new fleet.

Q. Are there any operational benefits to adding new renewable generation while the Company's aging coal-fired generation is still online to provide reliability?

A. Yes. Adding new renewable generation while the Company's coal-fired resources are still online is the ideal approach to ensure continued system reliability during the transition to cleaner energy resources while still enabling the Company to gain critically needed experience with renewable resources. Without that experience, Ameren Missouri risks being unable to reliably manage and operate its renewable generation fleet, and unable to fully understand the backup resource needs that may be required to ensure a reliable supply. Transitioning to renewable energy while more of our coal-fired generation and gas-fired peaking capacity is still in operation will allow us to gain this necessary experience with minimal risk of continuing to provide reliable service to our customers.

Q. Could you please be more specific regarding the experience Ameren Missouri seeks to gain?

A. Yes. By continuing to add new renewable energy in a staged and continuous manner while a significant portion of Ameren Missouri's existing generation fleet remains online, the Company will gain invaluable experience in two areas:

1) The ability to assess when and to what extent renewable energy is truly available over a wide range of weather conditions, which is dependent in large part on the location of the renewable resource, and
2) An understanding of how the existing Ameren Missouri generation fleet may need to be dispatched differently than historical dispatch patterns to provide critical

back-up generation during hours that intermittent renewable generation is not available.

By understanding the operational aspects of a significant portfolio of renewable energy resources under different weather conditions over a long period, the Company can also determine the optimal amount of renewable capacity needed to ensure a secure energy supply, ensuring we are not adding too much or too little new renewable energy generation. The Company may also learn how to increase generation through planned and preventative maintenance approaches, and how to optimize equipment selection based on project site characteristics. In addition, the Company can determine the amount of dispatchable generation and battery storage to maintain the reliability of least cost renewable energy. Said simply, by adding significant new renewable generation resources while the Company's coal-fired generation is still operational, Ameren Missouri can learn how to optimally plan and operate its generation fleet in a high renewables future without putting system reliability at risk.

Q. In discussing one of the six key points listed early in your testimony you mentioned the importance of geographical diversity. Can you please elaborate on how geographical diversity is related to providing a reliable and resilient energy supply?

A. Yes. An important factor to ensure long-term system reliability and resiliency is to pursue a geographically diverse portfolio of renewable energy resources to ensure energy is always available to meet our customers' needs, even during peak energy time periods. Since solar and wind generation are dependent on weather conditions which vary by geographical location, a regionally diverse renewable resource portfolio will be

more reliable under varying weather conditions. As discussed later in my testimony, over time, as ideal project sites are developed and land availability declines, it will become more challenging to achieve a regionally diverse portfolio of projects. This is another key reason the Company needs to continue to transition to clean energy now and sustain it. With the Solar Projects proposed in this docket plus the Boomtown and Huck Finn facilities, the Company will have about one-third of its solar generation in Illinois and about two-thirds of it in Missouri, mostly central/northeast Missouri.

Q. Would you please summarize what transitioning the fleet needs to look like over the next several years, and what the end state of the new fleet looks like?

A. Yes. Let's look ahead to what is planned through 2030. First, we need to keep steadily adding renewables that, over time and as we gain experience operating them, will fulfill our near-term energy shortage. These new renewable resources will work in tandem with existing generation resources (Callaway, Osage, Keokuk, Taum Sauk, Sioux, and Labadie) in a manner that ensures reliable system operations at the lowest cost reasonably possible. In parallel, we need to work towards the addition of a combined cycle gas plant (that may in the future include the capability to blend hydrogen or capture carbon emissions) by the end of 2030– in effect to replace the Sioux Energy Center – and incorporate additional energy storage resources into the fleet. As we execute this transition towards replacement energy and capacity resources, our operations will include leaning on the market as and when needed, as we have always done, but not to such a degree that we are exposed to significant risks of extreme costs or the risk that we simply cannot get the energy we need to serve our customers when we need it. As discussed above, the fact that the MISO market does not have the resource surplus it once did is clearly an important

factor in us implementing a Preferred Resource Plan that ensures that we can shield our customers and maintain reliability during tight system conditions.

In the end, the new fleet will consist of a diverse (technologically and geographically), resilient resource portfolio featuring different renewable and low- or no-carbon resources that complement each other and perform well under varied system conditions. A diverse portfolio of generating resources should deliver the most resilient and reliable energy for our customers over time. In fact, one could point to the lack of resource diversity in Ameren Missouri's existing resource portfolio, which has a majority of coal-fired resources that are aging, as a key factor heightening the urgency of our need to transition to the new fleet. Adding new resources in parallel with retiring the old coal plants starts to build that resource diversity gradually over time, while mitigating the risks increasingly facing coal-fired generating resources.

V. RISK OF INACTION: RENEWABLE PROJECT IMPLEMENTATION

Q. Why are the risks related to project implementation a key reason for the Company to pursue a gradual, sustained transition to clean energy?

A. Renewable energy development is a difficult, lengthy process with successful projects taking five to eight years to reach commercial operation. With each stage of the project lifecycle there is a risk that the project can be delayed, and at times cancelled altogether. The most significant implementation risks are likely to emerge in siting the project location, completing extensive transmission studies, evaluating transmission upgrade costs and completion schedules, completing environmental studies, conservation plans, and compliance requirements, acquiring real estate, obtaining local county permits and community support, qualifying for federal tax credits, evaluating

technology options, obtaining financing, receiving regulatory approvals, procuring key equipment in a timely manner, and designing, engineering, and finally constructing, commissioning, and testing of the new renewable energy center. A challenge, delay, or misguided decision can delay and potentially terminate the project. Given the number of renewable energy projects that are needed for a successful transition combined with the length and potential risks within the full lifecycle, it would be impractical, and frankly, irresponsible for the Company to continue to take a "capacity when needed" approach – as there is never a guarantee that each renewable energy project being pursued will come to fruition. We must start and sustain the transition to account for any potential delays.

Q. At a high level, what are the key project implementation risks associated with Ameren Missouri's planned renewable energy expansion?

A. The key project implementation risks include the following:

- Land (i.e., renewable site) availability
- Project permitting and construction
- Supply chain constraints
- Transmission interconnection
- Technology costs
- Financing costs
- Financing constraints

Q. Please explain why the availability of land for renewable siting is a key project implementation risk.

A. One of the most critical reasons for Ameren Missouri to pursue a controlled but sustained transition that starts immediately is to ensure the Company can acquire the

best available project sites in our region. The lengthy development, permitting, regulatory approval and construction cycle challenges described above, along with the myriad of development risks involved to successfully develop a good renewable energy project site, means that the best renewable energy sites are the first to be developed. Ameren Missouri is now also in competition with large technology firms from outside its service territory who are purchasing renewable energy projects in and around Missouri and Illinois for their announced sustainability goals and are equally as eager to find the best available project sites. An ideal project site will feature good renewable resource, favorable topography, good community relations, access to a favorable transmission interconnection point, and minimal environmental risk. This means that as the availability of suitable land declines, both the cost of the planned facility and the risks of not being able to obtain necessary permissions or not being able to construct the project at all are likely to increase.

Q. Please explain why project permitting is a key project implementation risk.

A. Placing a renewable energy project into service requires a series of preceding permits – these include but are not limited to environmental, construction, county, state, federal and other governmental permits. These activities require a great deal of lead time and if not obtained, could delay project construction, or even terminate a project. For example, to obtain the appropriate environmental permits, we must first complete several environmental studies to determine and mitigate any potential adverse impacts to the environment (e.g., water, land, natural habitat, etc.). These studies can take years to complete as they require extensive data collection and analysis. In some cases, the studies might indicate a fatal flaw in the project site. A fatal flaw would result in a change

in project site – making it important to pursue a pipeline of potentially suitable projects simultaneously to pivot to a more suitable project site from an environmental permitting perspective.

Prior to starting construction, local and county permits might be required. If there is a delay in receiving these permits, the construction schedule can be put at risk. A delay in schedule can jeopardize the in-service date, ultimately impacting the Company's ability to receive federal tax incentives or at times, preventing project implementation altogether. Building community support and engaging with key stakeholders early in the project development lifecycle will allow the Company to quickly identify potential delays and adjust accordingly.

But navigating these permitting issues takes a great deal of time and navigating them simultaneously with the large number of projects that would be needed all at once if we wait to add renewable capacity when the capacity need is here would be extremely difficult, if not completely impractical.

Q. Please explain the implementation challenges associated with constructing projects.

A. Once all necessary environmental and local government permits have been received, projects must be designed, engineered, and then constructed in a manner to provide at least 30 years of reliable energy. The design and engineering phase typically takes about a year. While recently performing due diligence on a solar project in an advanced stage of development (land acquisition, permitting and environmental assessment were all completed), Ameren Missouri discovered that the project was sited on land above a historical mine that potentially may be unsuitable for construction. Ameren

Missouri had to place the project on hold until suitable geotechnical due diligence could be completed to ensure that the project can be constructed and operated in a reliable manner.

The construction phase itself for solar and wind projects can take one to two years to complete. During this time there is heavy construction traffic on smaller local county roads that can be subject to weather delays. The supply chain for solar and wind generation is global and there are numerous opportunities for delays in manufacturing, shipment, and delivery. As with any large construction projects, actual construction may face challenges from an electric and mechanical component perspective, and therefore testing of the final project after completion of construction is critical. For the High Prairie and Atchison Renewable Energy Centers, the Company experienced several months of delay before achieving successful testing and commissioning and ultimately bringing the projects online.

Q. Please explain why supply chain constraints are a key project implementation risk.

A. Supply chain constraints can occur due to labor shortages, political upheaval (globally or otherwise), commodity supply and price changes, transportation challenges, or quality control issues. Challenges in the supply chain can lead to project delays, cost increases, or ultimately an inability to construct a project at all. Since supply chain problems can meaningfully disrupt the timing and costs of renewable energy projects, it is important to have a long implementation timeframe to maintain flexibility in the generation transition.

Q. Practically speaking, how does continuing to proceed with the pace and timing of the transition reflected in the 2022 Preferred Resource Plan mitigate supply chain risks?

A. By developing long-term strategic partnerships with key renewable equipment manufacturers as well as established renewable energy developers, we ensure a greater certainty of supply of key renewable project equipment. But to develop such strategic partnerships, we need a long-term and defined transition plan with a known stream of projects for which equipment can be acquired in a timely manner. The same dynamic exists when we have ongoing relationships with national renewable energy developers for new projects, so they can plan ahead for completing projects in a timely manner.

Given the 5- to 8-year life cycle for successful renewable energy project development, such partnerships are much more difficult to develop if a transition plan is not defined at least 10 years in advance to ensure certainty of equipment supply.

Q. Please explain why transmission interconnection is a key project implementation risk.

A. Transmission interconnection and upgrade costs remain one of the most important and, it is fair to say, challenging aspects, of renewable energy development. This includes the challenge of navigating MISO's Generator Interconnection Queue. The larger utility scale renewable energy projects must go through a transmission interconnection queue to determine the timing and cost of transmission upgrades that may be required for interconnection. This is not only challenging, but time-consuming. In MISO, generator interconnection at the transmission level is a three-phase process that can generally take up to three years to complete. The transmission upgrade costs are a function of the number of

projects in the queue, and the location and size of the projects. Generally, projects that are earlier in a queue can interconnect at a lower cost. It is also important to note that after Phase 2, a non-refundable 20% payment is due for expected transmission upgrades for a renewable energy project. As such, only the best projects with the most favorable locations and queue positions make it to the final Phase 3. Other projects are rejected due to high transmission costs in Phase 2, or at times even in Phase 3, as cost estimates can change throughout the process until it is clear which projects will proceed to construction.

At any point in the process, projects that the Company may be relying on could be terminated due to exorbitant interconnection costs, forcing the Company to start the 3-year cycle once again. Over the last ten years, less than half of the projects that enter the MISO Generator Interconnection Queue make it to start of construction. Ameren Missouri has first-hand experience with projects in which a great deal of time and effort was expended only to see the project fail due to no fault of the Company. The Brickyard Hills wind project,[30] for which the Commission granted Ameren Missouri a CCN in 2019 and which had likely been under development for approximately 10 years, ultimately had to be terminated due to unacceptably high transmission costs. As future queues get more and more constrained with new renewable energy projects, new transmission buildout will be needed. However, building new transmission lines to interconnect new renewable energy projects is generally a 6- to 10-year endeavor, if not longer. Although ideally transmission buildout will keep pace with renewable energy project buildout, projects later in the queue may have significantly higher transmission interconnection costs or may not be able to

[30] File No. EA-2019-0021.

operate at full output. This poses a real risk caused by delay because the energy from the generation we will ultimately place in service may be more costly or less reliable.

Q. How can the Company best manage transmission interconnection risks?

A. First and foremost, by continuing to proceed with the transition now and then sustaining it. Second, by acting on good projects when they are available, including smaller utility-scale projects like the Vandalia and Bowling Green Projects proposed in this docket, which were not required to navigate the difficult and lengthy MISO generation interconnection queue since they will connect to the distribution system. Third, by being flexible regarding the best renewable project acquisition approach for each specific project – whether we use a build-transfer, development-transfer, or self-development approach. The Company needs to maintain a renewable project pipeline with at least twice the number of projects needed for the inevitable transition to renewable energy and use the most appropriate acquisition approach for each project. To have a pipeline of twice the number of projects needed for our generation transition, we need to constantly be looking for – and acting on – good renewable projects in Missouri and surrounding states. Without a large pipeline and a phased approach, we are likely to face delays in project interconnection to the grid, significantly higher costs, or both, thus rendering our generation transition less reliable and more costly than it would have been had we obtained good project earlier in the transition process.

Q. Please explain why technology costs are a key project implementation risk.

A. Although Ameren Missouri hopes that renewable technology costs will ultimately decline, the last several years served as a reminder that continued cost declines are far from a guarantee. It is tempting to point to possible declining cost curve forecasts for wind and solar and recommend the Company wait until such declines materialize before proceeding with renewable development. But it is critical to remember that forecasted declines are not certain. Waiting for costs to decline is also a risky approach, because if those declines do not materialize customers could be exposed to higher costs for less ideal sites later. By adding investments steadily over time, we engage in a form of "dollar cost averaging" similar to that used in financial investing, while continuing to progress towards a prudent energy buffer.

Q. Please explain why financing costs are a key project implementation risk.

A. As I mentioned previously, investors are increasingly focused on concerted efforts by utility companies to transition their portfolios to cleaner and more sustainable resources as they make decisions about which companies to invest in and what kind of return on investment they expect based on their assessment of risk. This increased focus is expected to result in differences in cost of capital between those utilities that are making concerted and consistent efforts to transition their portfolios and those that are not.

Q. Please explain why financing constraints are a key project implementation risk.

A. Deferring implementation of renewable resources may require that Ameren Missouri invest huge amounts of capital in a short period of time, risking substantial deterioration to our credit metrics and impairment of our ability to cost-effectively and timely finance investments in the renewable generation we need when we need it. Staging the transition with a steady stream of additions over several years therefore reduces the expected financing costs associated with the renewable resources the Company needs to add.

Q. Has Ameren Missouri performed any analysis with respect to financing costs or constraints?

A. Yes. As part of the selection of our 2022 Preferred Resource Plan, we looked explicitly at certain credit metrics that may have an influence on Ameren Missouri's ability to raise capital to fund investments for our customers. More specifically, we analyzed and summarized the resultant credit metrics from our IRP risk analysis for plans that include different paths for the expansion of renewable resources in our portfolio. The table below shows the minimum single year credit metrics for two plans compared to Ameren Missouri's target credit metrics. The first metric is the ratio of funds from operations to total debt (FFO/Debt), and the second is the ratio of funds from operations to interest expense (FFO Interest Coverage). The two plans are the aforementioned Renewable Transition Plan and the Renewables for Capacity Need Plan.

Table 1

	FFO/Debt	FFO Interest Coverage
Target Metrics	25%	6.3
Renewables for Capacity Need	20%	6.2
Renewable Transition	24%	6.6

As Table 1 shows, the Renewables for Capacity Need Plan results in substantially lower minimum values for both FFO/Debt and FFO Interest Coverage than does the Renewable Transition Plan, particularly with respect to FFO/Debt. While these minimum annual values do not necessarily mean that a particular plan may result in significant challenges for raising capital, it does highlight the relative risk of plans that rely on short periods of heavy investment, like the Renewables for Capacity Need Plan, compared to plans that spread out major investments in renewable resources, like the Renewable Transition Plan.

Q. Practically speaking, what do you mean when you refer to raising the relative risk when there are short periods of elevated investment?

A. Assuming we can get access to sufficient capital, I am referring to the risk that projects may cost more because less favorable credit metrics generally lead to higher capital costs. And this would on be on top of the financing cost risk analyzed by Roland Berger in connection with the Company's 2022 preferred resource plan, which considered increased financing costs for entities that are not showing a clear and demonstrable commitment to moving to renewable generation as compared to those who are. We can avoid these concerns if we avoid waiting until there is imminent need for capacity to begin the transition.

Q. You have discussed the various implementation risks – land availability, permitting and construction, supply chain constraints, transmission interconnection, technology costs, financing costs, and other risks. In practical terms, what does the existence of those risks mean for Ameren Missouri and its inevitable need to add significant quantities of renewables during the planning horizon?

A. Consider what it will take to put the required renewable generation capacity in place. To have the energy it needs, the Company requires 2,800 MW of new renewable energy projects to be in place by 2030, which will take the place of the approximately 2,700 MW of coal-fired generation capacity and 500 MW of gas-fired peaking generation that will be retired by 2030. To date, the Commission has approved two projects for a total of 350 MW, one of which is for RES compliance. The Solar Projects proposed in this docket would add four more projects (550 MW) for a total of 900 MW. So while we are making progress, there is still a lot of work to do. As I noted, project development often takes 5 to 8 years, so we are already in the development window and need to be building now and on an ongoing basis to meet that need. To put numbers to it, while renewable energy projects are constructed in varying sizes, assuming each renewable energy project by 2030 has an average size of 200 MW, the Company needs approximately 14 (about 10 more beyond those already approved or that are proposed in this docket) new renewable energy projects to replace the retirement of three retiring coal-fired energy centers as well as the gas-fired generation in just the next eight years. By 2040, the Company may need up to an additional 24 new projects to replace all 4,500 MW of existing coal-fired generation capacity and 1,800 MW of gas-fired generation capacity that will retire between now and then. When I think about the difficulty of developing renewable generation and the associated

implementation risks, not steadily continuing to add the resources needed to complete Ameren Missouri's transition frankly worries me a great deal in terms of our ability to cost-effectively get the generation we need when we need it, and to do so while maintaining system reliability. There is no question in my mind that the project implementation risks I have discussed increase as the number of new renewable energy projects that the Company has to complete in a short time increases. The bottom line is that it is simply not practical to implement a reliable transition unless we continue to steadily add good projects as and when they can be developed and implemented on a timeline and with the flexibility needed to mitigate and manage various project implementation risks. And if we do not do that, as I also discussed earlier, we forgo valuable operational experience that can be gained by implementing the renewable energy resources steadily over the coming years.

VI. AVAILABILITY OF SIGNIFICANT TAX BENEFITS

Q. Are there tax credits available for the Solar Projects presented in this case?

A. Yes, there are significant federal tax credits available for these solar Projects to enhance the affordability of the Solar Projects for the Company's customers. Company witness Michels presents the project-specific modeling results for all four Projects presented in this case. All four projects are eligible for significant federal tax credit incentives. The total estimated value of the tax incentives available for the Solar Projects totals several hundred million dollars. These incentives hugely improve the affordability of the Company's planned transition to cleaner generation resources.

Q. How did the Inflation Reduction Act ("IRA") change or improve the tax credits available for solar resources?

A. Among its many impacts, the IRA extensively modifies provisions of the tax code for renewable energy projects. The IRA extends both the investment tax credit ("ITC") and production tax credit ("PTC"), creates additional wage and apprenticeship requirements that projects must meet to qualify for the full ITC or PTC value, and adds additional bonus credit amounts for domestic content and project location. The IRA enables solar projects to utilize the PTC or the ITC (previously solar projects could only elect the ITC) and allows taxpayers the ability to transfer tax credits to unrelated parties for cash.

Q. Are the Solar Projects eligible for any additional bonus credits on top of the base tax credits?

A. Yes. At least two of the four Projects are expected to be eligible for the energy community bonus incentive, which increases the value of the ITC from 30% to 40% or increases the PTC credit value in a given year by 1.1x. These projects are expected to be eligible because they are located in a community with a retired coal mine or coal generating facility. Beyond the additional tax incentive, which is highly lucrative for Ameren Missouri customers, these projects also boost economic activity in areas that historically had economic activity from fossil resources, thereby supporting a just transition for former coal communities in our region.

Q. Why is it important to pursue renewable projects in the near term to capture the available tax incentives?

A. Although the IRA extends available tax incentives for renewable resources into the early 2030s, they are still not expected to be available forever. If the Company

were to wait to add renewable resources, as would be the case if it followed an alternative Capacity Need Plan, these new and enhanced tax benefits would be unavailable. Moreover, there is no guarantee that Congress may not change the law in such a way that the tax credits under the IRA become unavailable earlier than 2032. Implementing a sustained and planned transition to renewable resources enables the Company to capture the IRA incentives and pass them back to customers, helping maintain customer affordability while the transitioning to a cleaner generating fleet.

Q. Has the Company included the value of these tax credits in its economic evaluations?

A. Yes. Company witness Michels discusses the Company's economic and financial analysis of portfolios and the individual Solar Projects, which includes the value of tax credits, in his direct testimony.

VII. CONCLUSION

Q. In summary, what is your recommendation to the Commission in this case?

A. I recommend the Commission approve a CCN for the Solar Projects because each of these Projects are a needed renewable energy resource addition to the Company's generation portfolio.

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 a Certificate of Convenience and Necessity for Solar Facilities	)))	EA-2023-0286

AFFIDAVIT OF AJAY K. ARORA

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

Ajay K. Arora, being first duly sworn on his oath, states:

My name is Ajay K. Arora, and hereby declare on oath that I am of sound mind and lawful age; that I have prepared the foregoing *Direct Testimony*; and further, under the penalty of perjury, that the same is true and correct to the best of my knowledge and belief.

\s\ Ajay K. Arora
Ajay K. Arora

Sworn to me this 16th day of June, 2023.