BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri 2023 Utility Resource Filing Pursuant to 20 CSR 4240-Chapter 22

File No. EO-2024-0020

SIERRA CLUB'S COMMENTS ON AMEREN'S 2023 INTEGRATED RESOURCE PLAN

PUBLIC VERSION

Pursuant to 20 CSR 4240-22.080, Sierra Club respectfully submits these comments on the 2023 Integrated Resource Plan ("IRP") filed by Ameren Missouri ("Ameren" or the "Company"). Sierra Club respectfully requests that the Company agree to fix, or the Commission order the Company to fix in its 2024 IRP Annual Update, the deficiencies identified herein.

TABLE OF CONTENTS

I. The Company must thoroughly evaluate the future of the Labadie units. 4

A. Deficiency 1: The Company's resource selection approach must be more objective and auditable—including the use of a capacity expansion model. 5

B. Deficiency 2: The Company inadequately addressed the many regulatory risks and related costs of continued coal operations at Labadie. 6

C. Deficiency 3: The Company should not massively overbuild its system. 13

II. The Company should not delay the Sioux plant's retirement yet again. 16

A. Deficiency 4: The Company's own analysis justifies retiring Sioux in 2028. 17

B. Deficiency 5: Reliability should not be used to justify keeping the plant online because Sioux is unreliable and costly. 18

C. Deficiency 6: The NGCC replacing Sioux was not modeled properly and should not be the default resource option. 20

III. Renewable resources' costs are overstated and should not be limited to being Company-owned. 22

A. Deficiency 7: The costs of clean energy resources are overstated. 22

B. Deficiency 8: The Company should also consider PPAs. 26

IV. CCS capital costs for new gas are too low, and its expected performance is overly optimistic 27

A. Deficiency 9: The Company's assumed capital costs of CCS on new gas are too low 27

B. Deficiency 10: The Company's assumed carbon removal rate is too high. 28

V. Deficiency 11: The Company should have considered the Grain Belt Express transmission line in its modeling. 29

VI. Deficiency 12: The Company should work with stakeholders to implement distributed generation programs that have federal funding. 30

VII. Deficiency 13: The Missouri Environmental Improvement and Energy Resources Authority ("EIERA") has applied for a Solar for All grant from U.S. EPA, and U.S. EPA will make award announcements in March 2024. 30

VIII. Conclusion 31

LIST OF EXHIBITS

SC-1	Public Company Responses to Data Requests
SC-2	Confidential Company Responses to Data Requests

I. The Company must thoroughly evaluate the future of the Labadie units.

Our primary concern in this IRP is that the Company has neglected to seriously assess the future of Labadie, its largest coal plant. The Missouri Public Service Commission ("Commission") has previously ordered Ameren to compare the continued operation of its coal units—accounting for all future costs—to their replacements.[1] But Ameren has failed to conduct a rigorous evaluation of the Labadie units, and in doing so it fails to adequately account for the economic risks faced by the plant. On the contrary, the Company continues to plan for the Labadie units to retire in 2036 (two units) and 2042 (two units) despite these headwinds. Of the 23 plans, only 3 plans assume that Labadie fully retires prior to 2042,[2] which is a small share of all plans. Given the many risks facing the plant, Ameren's analysis is overly optimistic at best.

Regarding the Company's evaluation of Labadie, we find several related deficiencies in this IRP:

- **Deficiency 1:** The Company's inadequate approach limits the ability to assess the units' economic viability because it hard-codes retirement dates rather than running capacity expansion modeling to choose an economically optimal plan while also ensuring auditability.
- **Deficiency 2:** The Company has failed to properly account for the many environmental cost risks at these units, including the proposed greenhouse gas

[1] Revised Order Establishing Special Contemporary Resource Planning Issues, File No. EO-2020-0047, at Issue O (issued Dec. 3, 2019), ("Analyze and document on a unit-by-unit basis the net present value revenue requirement of the relative economics of continuing to operate each Ameren Missouri coal-fired generating unit versus retiring and replacing each such unit in light of all the environmental, capital, fuel, and O&M expenses needed to keep each such unit operating as compared to the cost of other demand-side and supply-side resources.").

[2] Ameren Missouri's 2023 Integrated Resource Plan, [hereinafter "Ameren IRP"], Chapter 9, pp. 14-15.

limit, the latest ozone transport rule (Good Neighbor Rule), the proposed Mercury Air Toxics Standards ("MATS"), and the sulfur dioxide ("SO_2") or nitrogen oxide ("NO_X") emissions reductions that could be required to comply with the Regional Haze Rule.

- **Deficiency 3:** The Company is planning on overbuilding capacity, even when viewing its winter capacity obligations under the MISO seasonal capacity market. Ameren could afford to retire Labadie units earlier than planned and maintain adequate capacity.

In sum, Labadie faces potentially billions of dollars of compliance costs from various U.S. Environmental Protection Agency ("EPA") regulations. Instead of thoroughly assessing these impending obligations, Ameren has failed to adequately model a valid resource plan, and the Company's projected long position on capacity makes it well placed to accelerate cost-effective retirements of these units. These deficiencies are described in more detail below.

A. Deficiency 1: The Company's resource selection approach must be more objective and auditable—including the use of a capacity expansion model.

The Company's modeling methodology offers limited flexibility or auditability. One critical best practice of resource planning is to use a capacity expansion modeling where major decisions are made using objective, economic optimization. In pre-selecting plans without economic optimization, Ameren's IRP failed to create "a set of alternative plans based on substantively different mixes of supply-side resources and demand-side resources and variations in the timing of resource acquisition to assess their relative performance under expected future conditions as well as their robustness under a broad range of future conditions."[3] This failure to

[3] 20 CSR 4240-22.060(3).

rely on optimization and to study more coal retirements under a reasonable range of assumptions also fails to meet the IRP's fundamental policy goal of minimizing long run utility costs.[4] We note that conducting this type of modeling is necessary but not sufficient. The inputs and constraints set by the modeler also need to be reasonable to result in a reasonable plan. Later in these comments, we discuss issues with Ameren's cost assumptions.

The Company's current modeling approach involves pre-selecting retirement dates and new resource additions rather than conducting an objective economic optimization. In other words, Ameren employees manually determine which units retire on what dates rather than allowing a computer model to determine those results based on economics. To remedy this deficiency, Ameren should update its modeling approach by removing its hard-coded, pre-determined coal retirements and resource additions, and instead use a capacity expansion model to develop its plans. This would be a more unbiased approach that would also be more auditable for stakeholders and this Commission. Notably, Evergy opted to use a capacity expansion model starting in its 2022 IRP update.[5]

B. Deficiency 2: The Company inadequately addressed the many regulatory risks and related costs of continued coal operations at Labadie.

Ameren's analysis in this IRP fails to capture the myriad risks of continuing to keep the Labadie coal plant on its system. In part because the plant has no post-combustion pollution controls for nitrogen dioxide or sulfur dioxide, Labadie is vulnerable to high regulatory compliance costs on many fronts as one the largest polluters in the U.S. In 2022, Labadie was the

[4] 20 CSR 4240-22.010(2)(B).

[5] Evergy Integrated Resource Planning Presentation, Slide 6, (Oct. 4, 2023), *available at*: https://psc.mo.gov/CMSInternetData/Agenda%20Presentations/2023%20Presentations/10-04-2023%20Evergy's%20Integrated%20Resource%20Planning%20Presentation.pdf.

second-highest carbon dioxide ("CO_2") emitter in the power sector (18.9 million tons); the highest SO_2 emitter of any plant in the country (44,232 tons); and the sixth-highest NOx emitter of any plant in the nation (7,759 tons).[6] Given that Labadie is one of the largest sources of air pollution in the country and will thus likely be required to comply with a series of final and proposed regulations, the potential for retiring it earlier should have been explored more thoroughly in Ameren's resource plans. If Ameren seriously believes that it will install pollution controls to meet these cascading environmental regulations—a dubious outcome given what transpired at Rush Island—then it should say so clearly, providing all of its analyses, as well as the costs its customers can expect to incur compared to alternative options. By continuing with the status quo and by minimally addressing environmental requirements in a piecemeal fashion instead of holistically, Ameren deprives the Commission and ratepayers of the opportunity to meaningfully evaluate potentially lower-cost resource options for serving the Company's needs. Next, we discuss several environmental rules that will likely affect Labadie.

Good Neighbor Rule. Under EPA's finalized Good Neighbor Rule, which is designed to protect against harmful ground-level smog pollution, each of the Labadie units would likely be required to install selective catalytic reduction ("SCR") pollution controls, procure pollution credits commensurate with the pollution reductions achievable with those controls, or restrict operations during ozone season (May through October).[7] The Company estimates that SCR controls at Labadie would cost nearly ** [redacted] ** per unit.[8] Yet, despite the exorbitant

[6] Energy Information Administration ("EIA"), "Emissions by Plant and Region" in 2022, *available at:* https://www.eia.gov/electricity/data/emissions/.

[7] 87 Fed. Reg. 20,036 (Apr. 6, 2022).

[8] Ameren Response to Sierra Club Data Request SC 2-2, Confidential Att. Ameren Labadie SCR Study Report Client Review, pp. 2-4, 2-5.

cost of SCR controls, Ameren has largely ignored the prospect that such controls would be needed. Only one of the 23 plans analyzed assumes that SCR is required at Labadie (Plan D)—and it only assumes SCR on two of the four units.[9] Instead, in every other plan Ameren

** [redacted] ** [10] The Company said it modeled the SCR costs in one plan to "determine whether the investment in the technology would result in lower cost to customers to comply with the Good Neighbor Rule as opposed to just reducing generation."[11] Not surprisingly, the plan with SCRs is much more costly—roughly $700 million more than the preferred plan (Plan C).[12] The Company's takeaway should not be to shrug off these costs in favor of decreased generation; it should take the risk that SCR is required more seriously. Moreover, there is also the risk that the units would have to operate much less often in ozone season, which would be detrimental to the economics of the units. In contrast to Ameren's analysis, the EPA's technical documentation and state emission budgets for the final Good Neighbor Rule assumed that SCRs would be installed at all four Labadie units.[13] Thus, even Ameren's high-cost SCR plan is too conservative in including SCRs on only two units. If SCRs were required on all four units, per the EPA's assumption, then the capital costs alone would be over ** [redacted] ** more than what the

[9] Ameren IRP, Chapter 9, p. 30.

[10] Ameren Response to Sierra Club Data Request SC 2-2(g) CONFIDENTIAL.

[11] Ameren IRP, Chapter 9, pp. 12, 14-15.

[12] Ameren IRP, Chapter 9, Appendix A, Table 9A.8.

[13] EPA, *Good Neighbor Plan for 2015 Ozone NAAQS*, *available at:* https://www.epa.gov/Cross-State-Air-Pollution/good-neighbor-plan-2015-ozone-naaqs (see the following technical support documents: "Appendix A Final Rule State Emission Budget Calculations and Engineering Analytics" and "appendix-a-of-the-ozone-transport-policy-analysis-final-rule-tsd-for-the-federal-good-neighbor-plan").

Company is currently assuming in its preferred plan, which is zero. This is simply too large of a cost risk to be neglected.

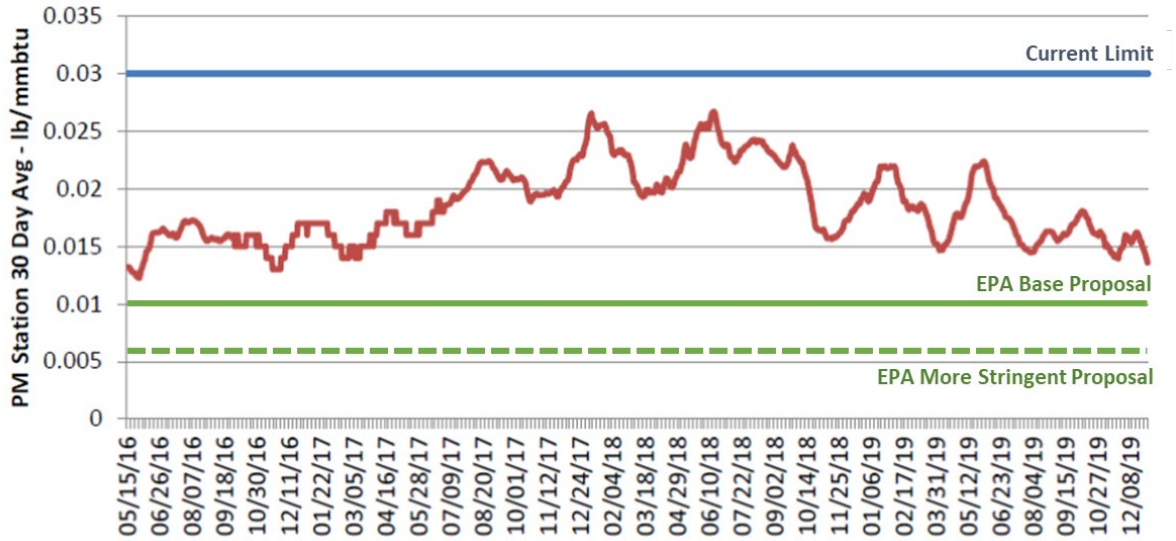
In addition to and separate from the Good Neighbor Rule, the non-attainment implementation plan process for St. Louis metropolitan area creates an independent risk that Ameren will have to install SCR at Labadie. In October 2022, EPA reclassified the St. Louis region's non-attainment area from "marginal" to "moderate" nonattainment due to a persistent failure to attain the 2015 ground-level ozone National Ambient Air Quality Standards ("NAAQS").[14] Missouri DNR submitted a nonattainment plan that does not seek any reductions from Labadie, related to its contribution to ongoing public health harm in St. Louis. That plan must be approved by EPA, and there is a risk that EPA would reject aspects of the plan, requiring NOx reductions from Labadie.

MATS and particulate matter NAAQS. Another major risk to the Labadie units is the potential for particulate matter ("PM") controls to comply with the proposed Mercury and Air Toxics Standards. The current emissions limit for filterable PM ("fPM") is 0.03 lbs per MMBtu for coal units. But the EPA has recently proposed a more stringent limit of 0.01 lbs per MMBtu (i.e., one third of the current emission rate) and is considering a "more stringent" option of 0.006 lbs per MMBtu (i.e., one fifth of the current emission rate).[15] As the Company shows below, Labadie is comfortably below the current 0.03 lbs per MMBtu limit, but it would easily exceed either of the two proposals being evaluated by EPA.

[14] 87 Fed. Reg. 60,897 (Oct. 7, 2022).

[15] EPA, *EPA's Post-IRA 2022 Reference Case Documentation Supplement Supporting RIA Analysis of Proposed MATS RTR,* Table 3, *available at:* https://www.epa.gov/system/files/documents/2023-04/Supplemental%20Modeling%20Documentation.pdf.

Figure 1: Labadie PM Emission Rate (in red) and Current MATS Limit Compared with Proposed Limits (lbs/MMBtu)[16]



As with the Good Neighbor Rule, Ameren is being overly optimistic by assuming no new controls to comply with a new proposed MATS fPM limit in this IRP; instead, the Company claims it is still evaluating the proposed rule and "determining if additional compliance measures will be necessary."[17] The Company also was not able to provide recent cost estimates of PM controls.[18] But EPA has modeled compliance with both proposed limits in its regulatory impact analysis ("RIA") and assumes that all four units would require electrostatic precipitator ("ESP") rebuilds under the 0.01 lbs per MMBtu limit, or new fabric filters (i.e., baghouses) on all units under the more stringent 0.006 lbs per MMBtu limit.[19] Using EPA's cost assumptions, a new

[16] Ameren IRP, Chapter 5, Figure 5.7. Copy of Company's figure with additional lines for EPA's proposed limits added by the author.

[17] Ameren IRP, Chapter 5, p.12.

[18] Ameren Response to Sierra Club Data Request SC 3-1 (indicating that it does not have recent cost estimates of fabric filter (i.e. baghouse, ESPs, or any other PM control options)).

[19] EPA, *EPA's Post-IRA 2022 Reference Case Documentation Supplement Supporting RIA Analysis of Proposed MATS RTR,* Table 3, *available at:* https://www.epa.gov/system/files/documents/2023-04/Supplemental%20Modeling%20Documentation.pdf.

ESP rebuild would be over $200 million in capital costs ($88 per kW) for the plant in order to comply with the proposed limit.[20] Under the more stringent option, fabric filters could cost between $360 to $870 million ($150 to $360 per kW).[21] These compliance costs represent another large risk of keeping Labadie on-line that the Company is failing to account for in this IRP.

A more-stringent PM NAAQS would create further risk for Labadie and will require upgrades to reduce particulate emissions. On February 7, 2024, U.S. EPA issued a final rule to lower the primary NAAQS for fine/inhalable particulate matter ("$PM_{2.5}$"). EPA's final rule lowers the primary annual NAAQS $PM_{2.5}$ standard from 12 micrograms per cubic meter ("µg/m3") to 9 µg/m. Parts of the St. Louis metro area are projected to be in non-attainment for the new, lower NAAQS.[22]

GHG Standards. The Company is also not accounting for the potential that the EPA's greenhouse gas ("GHG") limit under Section 111(d) of the Clean Air Act could require carbon capture and sequestration ("CCS") at its coal units. (We address the Company's treatment of new gas plants under the GHG rule later in these comments.) The proposed rule, which is expected to be finalized later this spring 2024, requires that existing coal units either: 1) install CCS with 90 percent capture by 2030, if the owner is planning to operate it after 2039; 2) co-fire with 40 % (by volume) gas by 2030 if the unit retires prior to 2040; 3) operate at a 20 percent capacity

[20] *Id.*, Table 1.

[21] *Id.*

[22] *See* Congressional Research Service, Air Quality: EPA's 2023 Proposed Changes to the Particulate Matter (PM) Standard, dated August 2023, p. 11 (showing a map of projected non-compliance counties).

factor if retiring prior to 2035; or 4) retire the unit prior to 2032.[23] If the Company intends to run the Labadie units after 2032, per this rule, it must choose one of the above options (1) to (3) by 2030. We understand that the final rule may change, but the likelihood that Ameren can plan to run Labadie until 2042 without doing any of the above measures appears slim. In particular, it is possible that CCS will still be required if any of the units are operating into the 2040s as Ameren plans to in this IRP. Yet the Company has again not included any of these costs. The EPA estimates that the capital costs of CCS would be over $2,400 per kW, which would be nearly $1.5 billion per unit at Labadie.[24] CCS operation also entails transportation and storage costs for captured carbon, and other additional operations and maintenance costs at the plant. Moreover, CCS results in significant heat rate and capacity penalties at the unit (i.e., the capacity of each unit could be reduced by as much as a third).[25] Ameren must address the prospect of CCS if it is to operate Labadie in the next two decades.

SO_2. Finally, Ameren does not account for the costs and risk of SO_2 regulation at Labadie. EPA's Regional Haze Rule or an updated NAAQS could drive the need for new flue gas desulfurization ("FGD") at the plant. Ameren should account for these costs because they are an additional existential risk to the coal units. Per the Regional Haze Rule—which required Missouri to implement regulations in 2021 and revise regulations in 2028 to reduce SO_2 and NO_x pollution that impair visibility in national parks—the Labadie units could similarly be required to

[23] EPA, *Clean Air Act Section 111 Regulation of Greenhouse Gas Emissions from Fossil Fuel-Fired Electric Generating Units*, Slides 13, 15-16, *available at:* https://www.epa.gov/system/files/documents/2023-05/111%20Power%20Plants%20Stakeholder%20Presentation2_4.pdf.

[24] EPA, TSD – GHG Mitigation Measures for Steam EGUs in Docket No. EPA-HQ-OAR-2023-0072, (Document No. EPA-HQ-OAR-2023-0072-0061_attachment_3), (May 29, 2023), *available at:* https://www.regulations.gov/document/EPA-HQ-OAR-2023-0072-0061.

[25] *Id.*

install expensive pollution controls.[26] In addition, the EPA has yet to update the SO_2 NAAQS since 2010. If the agency re-evaluates the 75 parts per billion ("ppb") at a later date, then reductions could be required at Labadie.

In sum, the Company's plan to operate Labadie for the better part of two more decades carries substantial risk to ratepayers. Any of the regulations discussed above, taken individually, could necessitate the retirement of some or all Labadie units. Taken collectively, they are too staggeringly expensive to ignore. Ameren has a history of hoping for the best and engaging in protracted litigation when it comes to environmental control costs. But hope is not a strategy and litigation has uncertain outcomes. History is unfortunately repeating itself in this IRP. We respectfully request that the Company take a more sober, honest look at what could be required at the Labadie units across all of the final and proposed regulations impacting this plant. At a minimum, all of the above regulations should be addressed thoroughly in the next IRP Annual Update.

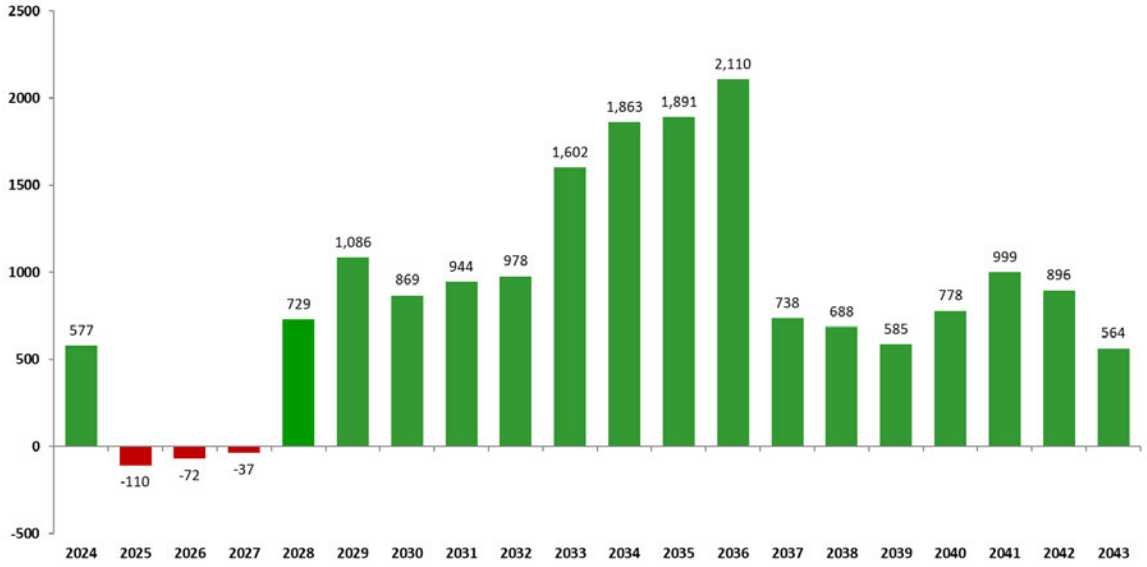
C. Deficiency 3: The Company should not massively overbuild its system.

The Company is planning on being massively overbuilt, even when viewing its winter capacity obligations. Ameren is well-positioned to retire uneconomic coal units earlier than currently planned, in part, because it is planning on having significant headroom. Between 2028 and 2040, the Company is planning on having on average more than 1,000 MWs of excess winter capacity (the season that is likely to drive capacity requirements going forward in the region), relative to the assumed MISO requirement for that season—shown below.[27]

[26] *See* 42 U.S.C. § 7491(b)(2); 40 C.F.R. § 51.308.

[27] Ameren Response to NRDC Data Request NRDC 1-18, Att. Chp 10 Capacity Position-Winter.xlsx, "PRP - MISO RA View" tab.

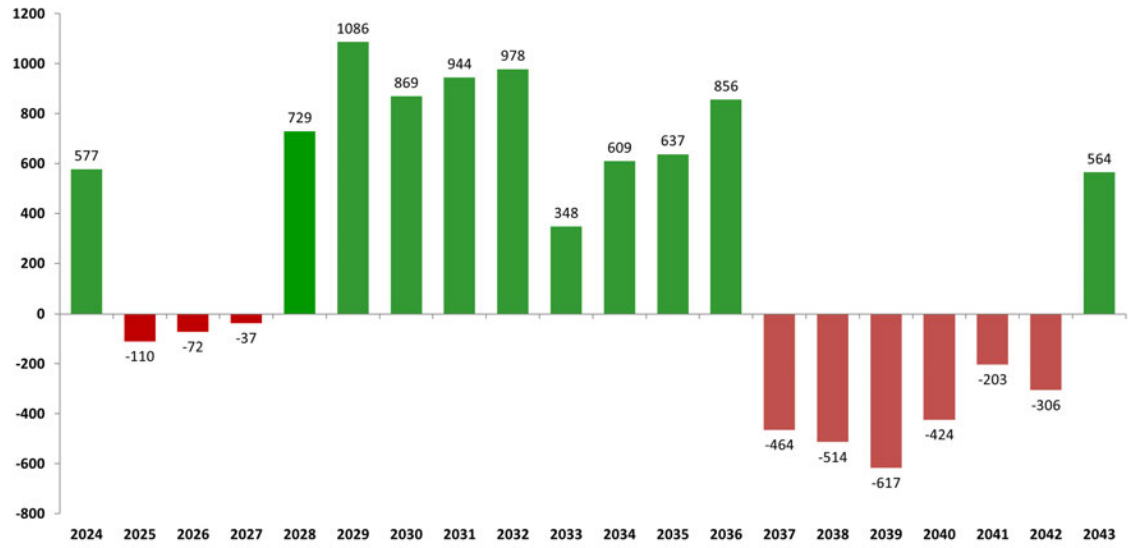
Figure 2: Winter Capacity Surplus/Deficit with Labadie Retirement in 2036/2042 (Ameren's Preferred Plan)[28]



With this level of surplus, Ameren could accelerate the retirement of the Labadie units and still have excess winter capacity. For instance, as an illustration, we moved up the Labadie dates to have two units retire in 2033 and the remaining two in 2036. As shown below, with no other changes to the Company's preferred plan, these earlier retirements could be implemented without a new capacity need occurring until 2037 and only a modest deficit thereafter.

[28] *Id.* Company's figure from workbook.

Figure 3: Winter Capacity Surplus/Deficit with Labadie Retirement in 2033/2036[29]



Ameren's failure to robustly study more retirement options for the Labadie coal units is a result of several deficiencies. Ameren's failure to conduct capacity expansion modeling and instead model pre-selected portfolios with little auditability fails to meet the IRP's objective of meeting customer requirements through cost minimization because Ameren's approach has shielded possible lower-cost paths from study.[30] Also, as noted in Section III, Missouri IRP rule 20 CSR 4240-22.010(2)(C)(1) requires that Ameren consider the "[r]isks associated with new or more stringent legal mandates that may be imposed at some point within the planning horizon." Additionally, 20 CSR 4240-22.060(3)(C) states that the "utility shall include in its development of alternative resource plans the impact of . . . (1) [t]he potential retirement or life extension of existing generation plants. . . and (2) [t]he addition of equipment and other retrofits on generation plants to meet environmental requirements." Finally, the Company's plan to massively overbuild

[29] *Id.* Adjustment to Company's figure and workbook with accelerated Labadie retirement in 2033 and 2036.

[30] 20 CSR 4240-22.010(2)(B).

capacity presents further cost risks—in addition to environmental compliance risks—by charging customers excessively for capacity that is not needed, especially because maintaining capacity, such as the Labadie coal units, can be expensive given the cost of ongoing capital maintenance and other spending. This relates to Missouri's IRP requirement focused on the long-term minimization of customer costs.[31] To decrease cost and risk to ratepayers, Ameren should have more seriously considered retiring Labadie units earlier—and indeed it could do so without producing a new capacity need until 2037.

II. The Company should not delay the Sioux plant's retirement yet again.

In this IRP, Ameren chose to retire the Sioux plant in 2032. The Company also modeled 2028 and 2030 dates for comparison. Throughout recent years of resource planning, Ameren has continually delayed the retirement of the Sioux plant. In its 2020 IRP, the Company's preferred plan included retiring the plant in 2028.[32] In its 2022 Change in Preferred Plan, the Company delayed the retirement to 2030.[33] Now, the Company is delaying that retirement yet again. We find several deficiencies with this decision:

- **Deficiency 4:** The Company's own analysis justifies retiring the Sioux plant in 2028.
- **Deficiency 5:** The Sioux plant is costly and unreliable, contrary to Ameren's claims that it needs to be kept on the system to maintain reliability.

[31] 20 CSR 4240-22.010(2)(B).

[32] Ameren 2020 IRP, Executive Summary, p. 4, *available at:* https://www.ameren.com/-/media/missouri-site/files/environment/irp/2020/ch1-executive-summary.pdf?la=en-us-mo&hash=67ECB83304090AE189E1528AABDD2211E5A091BC.

[33] Ameren Notification of Change in Preferred Plan, p. 3, *available at:* https://www.ameren.com/-/media/missouri-site/files/environment/irp/2022/preferred-plan.ashx.

- **Deficiency 6:** The replacement resource for Sioux, a natural gas combined cycle ("NGCC"), was not modeled properly and should not be the default resource option.

A. Deficiency 4: The Company's own analysis justifies retiring Sioux in 2028.

Ameren's portfolios looked at Sioux retirement dates of 2028, 2030, and 2032. The Company ultimately chose the latest of those dates, despite the lack of strong evidence for doing so. First, the cost differences between the three retirement dates are miniscule, as shown below:

Table 1: Portfolio Costs Across Sioux Retirement Options[34]

Sioux retirement portfolio	PVRR ($mil)	% change from preferred plan
2032 (Preferred Plan/Plan C)	$81,985	-
2030 (Plan A)	$82,002	0.02%
2028 (Plan B)	$82,003	0.02%

The costs of retiring Sioux in 2030 versus 2032 is an increase of 0.02 percent in PVRR, a margin which in modeler's parlance is called "in the noise" because the level of exact precision with any modeling exercise is dubious. Also, the costs of retiring in 2028 and 2030 are nearly identical. Thus, on a pure-cost basis, and taking the Company's modeling as-described, it is anyone's guess what the best option would be for Sioux. But the Company also conducted a qualitative analysis of its portfolios in its scorecard, where it rated many risks of each portfolio, including financial risks, customer satisfaction, economic development, and resource diversity. The rankings of all portfolios in this scorecard show that the earlier the retirement of Sioux, the

[34] Ameren IRP, Chapter 9, Appendix A, Table 9A.8.

better the score. Retirement in 2028 scored a 4.2 while both 2030 retirement and 2032 retirement scored a 3.8.[35] The portfolio with a 2028 retirement outscored the 2030 and 2032 options based on resource diversity and the level of rate increase.[36] Given the cost and scorecard results, Ameren could have made the case for a 2028 Sioux retirement on its own scorecard. Further, Ameren's scorecard did not include public health impacts, and retiring a large coal plant near a metropolitan area would be expected to improve human health. Accordingly, Ameren could have used its own scorecard plus a public health benefit to select at 2028 retirement. As we discuss below, there is even further evidence to support the earlier date.

B. Deficiency 5: Reliability should not be used to justify keeping the plant online because Sioux is unreliable and costly.[37]

Part of Ameren's justification for delaying the Sioux retirement is for reliability. The Company states that:

> 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.[38]

But this claim is problematic because the plant is unreliable and costly. On a plant-wide basis, the forced outage rate reported by Ameren was 13.6 percent for 2023.[39] Sioux unit 1 has been forced out more than 10 percent of the time in the past six years, including 18 percent in

[35] Ameren IRP, Chapter 10, Appendix A, p.1.

[36] *Id.*

[37] Public Direct Testimony of Tyler Comings, Missouri Public Service Commission Docket No. ER-2022-0337, pp. 15-19, (Jan. 10, 2023), *available at:* https://efis.psc.mo.gov/Document/Display/273456.

[38] Ameren IRP, Chapter 10, p.17.

[39] Ameren Response to Sierra Club Data Request SC 1-3, Att. SC 1-3 m-n-o.xlsx.

2023.[40] The Company's modeling assumes that the situation will ** [redacted] ** in the future. The modeling in this IRP assumes that Sioux unit 1 will be fully forced out ** [redacted] **percent of the time, and Sioux unit 2 will be ** [redacted] ** percent of the time.[41] Put differently, each unit may be out for unplanned reasons in roughly ** [redacted] **—this is hardly a reliable resource.

In addition, the Company expects the units to become ** [redacted] ** (on a per MWh-basis) in the future. The production costs, fuel and O&M, per MWh, ** [redacted] ** for the remaining life of the units as shown below:

Table 2: Sioux Production Costs ($MWh) (CONFIDENTIAL)[42]

** [redacted] **

[40] *Id.*

[41] Ameren Response to Sierra Club Data Request SC 1-2, Confidential Att. SC 1-2 m-n-p CONF.xlsx.

[42] *Id.*, Confidential Att. SC 1-2 i-j-q-r_CONF.xlsx; Ameren workpaper: Ameren MO 2023 IRP\Workpapers\22.060 Integrated Resource Plan\1-Integration\RevReq\Powersimm\Sioux 2032.xlsx.

** [redacted] ** [43]

The units have selective non-catalytic reduction ("SNCR") pollution controls, which have a much lower NO_X removal rate than an SCR. ** [redacted] [44] [redacted] ** First, as with Labadie, the EPA assumes that Sioux would need SCR to comply with the Good Neighbor Rule, and that is even when the agency is assuming that the units will retire in 2030 as opposed to 2032.[45] Second, ** [redacted] ** The Company cannot have it both ways.

C. Deficiency 6: The NGCC replacing Sioux was not modeled properly and should not be the default resource option.

The default replacement resource for the Sioux plant is seriously underestimated in the Company's modeling. Almost every plan modeled by Ameren included a new NGCC after the Sioux plant was assumed to retire.[46] Thus, there is a new NGCC installed in 2029, 2031, or 2033 corresponding to the 2028, 2030, and 2032 Sioux retirement dates. The Company assumed that

[43] Ameren workpaper: Ameren MO 2023 IRP\Workpapers\22.060 Integrated Resource Plan\1-Integration\RevReq\Powersimm\Sioux 2032.xlsx.

[44] Ameren Response to Sierra Club Data Request SC 2-2(g) CONFIDENTIAL.

[45] EPA, *Good Neighbor Plan for 2015 Ozone NAAQS*, *available at:* https://www.epa.gov/Cross-State-Air-Pollution/good-neighbor-plan-2015-ozone-naaqs (see the following technical support documents: "Appendix A Final Rule State Emission Budget Calculations and Engineering Analytics" and "appendix-a-of-the-ozone-transport-policy-analysis-final-rule-tsd-for-the-federal-good-neighbor-plan").

[46] Ameren IRP Chapter 9, pp. 14-15.

NGCC's installed by 2035 would have CCS on them, and that other NGCC's would include a CCS retrofit by 2040—with the one exception of the NGCC that replaces Sioux.[47] For this NGCC, the Company simply assumes that it will have "CO_2 emissions eliminated beginning in 2040" with "no major capital expenditures for CCS."[48] The Company did include O&M costs associated with CCS for this plant, but no new capital costs. For all other NGCC installations, the Company assumes roughly an additional $1,000 per KW for the addition of CCS technology,[49] but the NGCC replacing Sioux is given a pass on this cost. Instead, the Company should have assumed CCS technology would be required at this NGCC, as it did with all other new builds of this type, and in light of those costs also considered other replacement options for Sioux.

Ameren's further delay of the Sioux plant's retirement is a result of several deficiencies outlined above and also overlaps with some of the deficiencies noted for treatment of the Labadie plant—such as the lack of objective optimization modeling. These deficiencies all relate to a lack of cost minimization for customers.[50] Also, as with Labadie, the Company has not sufficiently addressed the "[r]isks associated with new or more stringent legal mandates that may be imposed at some point within the planning horizon" for Sioux.[51]

---

[47] *Id.,* p.15.

[48] *Id*.

[49] Ameren IRP Chapter 6, Table 6.5, p. 23.

[50] 20 CSR 4240-22.010(2)(B).

[51] 20 CSR 4240-22.010(2)(C)(2).

III. Renewable resources' costs are overstated and should not be limited to being Company-owned.

In this section, we discuss how the Company has overestimated the costs of new renewable and storage resources, which has unfairly disadvantaged these resources relative to new gas. This is compounded for the new NGCC discussed above that produced zero carbon without new CCS capital costs. The Company has also not allowed for power purchase agreements ("PPAs") of these resources in its modeling, instead opting for only self-build options.[52] A true economic assessment must include reasonable assumptions and methodology and allow for existing and new resources to compete with one another on equal footing, all with an eye to the costs to ratepayers. We have identified two deficiencies in this area:

- **Deficiency 7:** The Company has overstated the costs of renewables and storage.
- **Deficiency 8:** The Company should also consider PPAs.

A. Deficiency 7: The costs of clean energy resources are overstated.

Ameren's cost projections for solar and wind resources are overstated in two ways: 1) the Company assumes that the recent uptick in costs will ** [redacted] **, which unfairly inflates these costs for the modeling period; and 2) the Company's application of Inflation Reduction Act ("IRA") tax credits are cut short too soon.

For new clean energy resources, Ameren constructed long-term forecasts of overnight capital costs using the National Renewable Energy Laboratory's ("NREL") Annual Technology Baseline ("ATB") data in combination with market data for solar[53] and wind[54] resources. For

[52] Ameren IRP Chapter 6, p. 26.

[53] Ameren IRP Chapter 6, p.7.

[54] *Id.*, p.12.

solar resources, ** [redacted] ** [55] For wind resources, ** [redacted] ** [56] We compared Ameren's forecasts with more up-to-date cost projections from NREL's 2023 ATB and the U.S. Energy Information Administration's ("EIA") 2023 Annual Energy Outlook ("AEO"). Although Ameren expects the costs of these resources to decline in the future,[57] its forecasts assume that the costs ** [redacted] ** [58] Even if cost forecasts, like NREL and EIA, project flat or declining costs (after adjusting for inflation), merely applying the percentage changes to a ** [redacted] ** still leads to ** [redacted] ** that are overstated especially in the medium- or long-term. As a result, Ameren's assumed capital costs for these resources are ** [redacted] ** than those reported in NREL's 2023 ATB and EIA's 2023 AEO—as shown below in Figure 5 and Figure 6 for solar and wind resources, respectively.

[55] Ameren IRP Confidential Workpapers, "Cost Assumptions_Confidential.xlsx."

[56] *Id.*

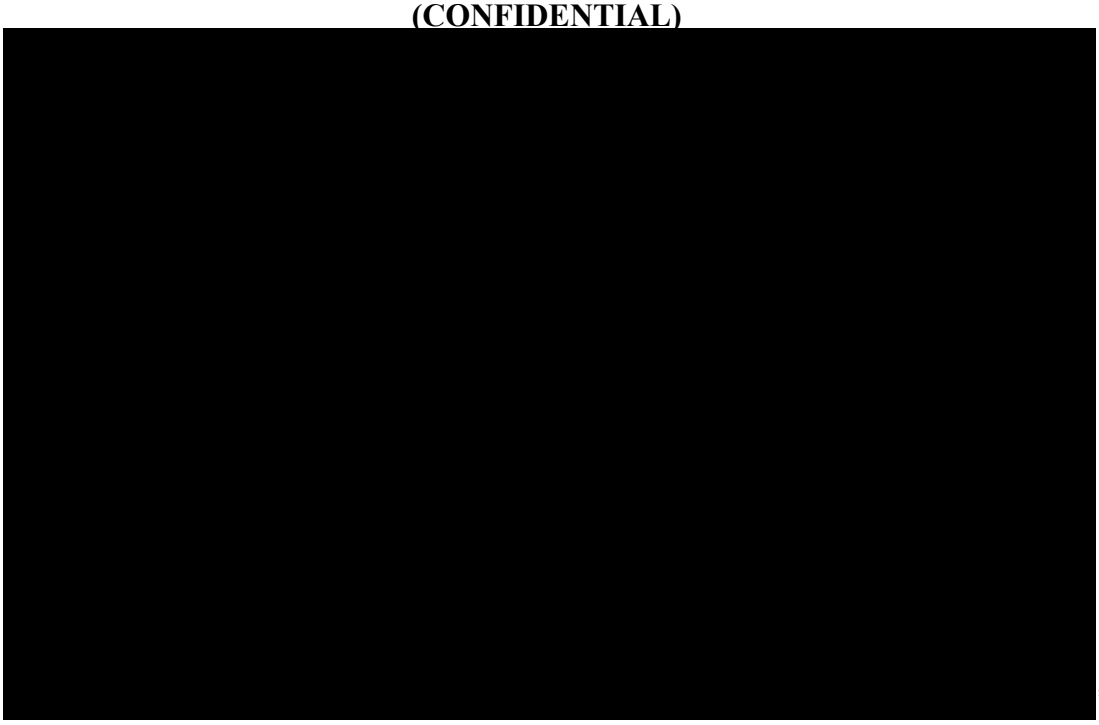
[57] Ameren IRP, Chapter 6, pp. 7, 12, 19.

[58] Ameren IRP Confidential Workpapers, "Cost Assumptions_Confidential.xlsx."

Figure 4. Comparison of Overnight Capital Costs for Solar Resources (2023$/kW) (CONFIDENTIAL)

**  **

Figure 5. Comparison of Overnight Capital Costs for Wind Resources (2023$/kW) (CONFIDENTIAL)

**  **

Although interconnection and supply chain issues have created upward pressure on the costs of clean energy technologies over the past few years, it is unlikely that these **

[redacted]** will persist in the long-term. In fact, some of these challenges related to supply chain issues have started to show some relief, and there has been movement at the federal level to improve the interconnection process that has created a bottleneck in many regions in the United States. Thus, the Company's assumption that **[redacted]** and this assumption should be corrected to rely directly on long-term forecasts themselves.

Ameren's conservative modeling of renewables and battery storage assumes that the tax credits provided through the IRA start to decrease for resources that come on-line starting in 2033.[59] However, the IRA indicates that the tax credits will only start to decline at that time if the U.S. power sector meets its GHG emissions target of achieving 75 percent of 2022 levels by 2032.[60] If this requirement is not achieved, the decline in tax credits will be delayed and the full credits remain in place until the emissions target is met. Ameren is therefore assuming the least amount of tax credits that is possible under the law. Instead, we recommend that the Company assume that the tax credits are fully available at least until 2040. We are pleased that the Company included a 10 percent adder for battery storage through 2029.[61] We encourage the Company to also apply an energy community adder for at least a share of the new solar and wind projects as well.

[59] Ameren IRP Chapter 9, p.8.

[60] Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818. Sections 13701 and 13702.

[61] Ameren Response to Sierra Club Data Request SC 1-5, Att. SC 1-5 Tax Credits.xlsx.

B. Deficiency 8: The Company should also consider PPAs.

Ameren's modeling of supply-side resources focused solely on self-builds for clean energy resources.[62] This assumption failed to consider procuring these resources through PPAs, which ignores the potential for lower costs to customers under these arrangements. It is unrealistic to ignore the option that a third-party could build (and possibly operate) these resources in the future. This modeling approach of assuming that all new renewable resources are self-build is disadvantageous when comparing the net present value of different scenarios. A PPA is typically structured on a levelized cost basis, sometimes as a percentage escalation, whereas self-build resources have much higher costs in earlier years than in later years due to the decreasing rate base and rate of return. In order to capture a more realistic procurement of future PPAs, Ameren should structure some of the new resources in its model as PPAs.

Even with these flaws, the Company's "all renewables" plan (Plan T)—where there are only clean resource additions after 2028—was the cheapest plan.[63] The Company, however, stated that this plan is "not considered to be a feasible or desirable path. As a result, procuring better information, regardless of the cost, would not bear on plan selection."[64] But this is not a helpful analysis. The Company should not present a plan that is infeasible in the first place; while the Company should not shy away from ambitious plans, it also should only model plans that could be executed. Moreover, even if the Company's claims about this plan were true, the plan's low costs should have led the Company to ask: is there a "nearly all renewables" plan that

[62] Ameren IRP Chapter 6, p.26.

[63] Ameren IRP Chapter 9, Figure 9.11.

[64] Ameren IRP Chapter 10, p. 49.

would be feasible? That obvious question unfortunately has not been answered in this IRP, and thus Ameren has inadequately addressed the long-term minimization of customers' costs.[65]

IV. CCS capital costs for new gas are too low, and its expected performance is overly optimistic.

As previously mentioned, the Company assumed CCS was installed on all new NGCC builds. This is in response to EPA's proposed greenhouse gas rule for carbon pollution standards at fossil fuel-fired power plants, which includes CCS as a potential emissions reduction pathway, with a requirement of achieving 90 percent capture of CO_2 by 2035 for gas-fired power plants.[66] In the modeling in this IRP, however, the Company used CCS costs that are too low and assumed too high of a carbon removal rate.

- **Deficiency 9:** The Company has understated the costs of new gas CCS.
- **Deficiency 10:** The Company has overstated the carbon removal from new gas CCS.

A. Deficiency 9: The Company's assumed capital costs of CCS on new gas are too low.

The Company assumed capital costs of new gas with CCS would cost $2,207 per kW to install in this IRP.[67] Separately, Ameren provided comments to EPA in response to the greenhouse gas rule, in part to argue that the EPA's cost assumptions for CCS were too low. Citing to the EIA's costs, the Company stated that the EIA showed that "capital costs have

[65] 20 CSR 4240-22.010(2)(B).

[66] EPA, *New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule*, Proposed Rule, 88 Fed. Reg. 33240 (May 23, 2023).

[67] Ameren IRP Chapter 6, p. 23.

increased since 2020."[68] Indeed, the capital costs that Ameren cited from EIA for a new NGCC with CCS were over $3,000 per kW.[69] Despite the Company's suggestion for EPA to increase cost assumptions in the proposed rule, however, Ameren decided to use much lower CCS capital cost assumptions in its IRP modeling. The Company should use a more realistic cost assumption for this technology.[70] Ameren's unrealistically low capital cost assumptions for gas generation unfairly biases its resource selection, thereby departing from the IRP's policy objectives of considering resources on an equivalent basis and minimizing long-run utility costs.[71]

B. Deficiency 10: The Company's assumed carbon removal rate is too high.

Power plants equipped with CCS have failed to achieve carbon capture rates above 90 percent on a consistent basis. In Canada, Boundary Dam Unit 3—a CCS-equipped, coal-fired generating unit—has underperformed on its expected carbon capture efficiency by 50 percent over its lifetime.[72] Despite the lack of success of CCS in the electric sector, Ameren's modeling assumes a carbon capture rate equal to 98.5 percent for new gas-fired combined cycle equipped with CCS.[73] Separately, in its comments to EPA, Ameren critiques that CCS, as a system or as individual components (i.e., capture, transport, sequestration), have not been adequately

[68] Ameren Corporation, Comments to the U.S. Environmental Protection Agency in Docket No. EPA-HQ-OAR-2023-0072 (Document No. EPA-HQ-OAR-2023-0072-0660), p. 25, (Aug. 8, 2023), *available at:* https://www.regulations.gov/comment/EPA-HQ-OAR-2023-0072-0660.

[69] EIA, *Cost and Performance Characteristics of New Generating Technologies, Annual Energy Outlook 2023*, Table 1, *available at:* https://www.eia.gov/outlooks/aeo/assumptions/pdf/elec_cost_perf.pdf.

[70] 20 CSR 4240-22.010(2)(C)(1).

[71] 20 CSR 4240-22.010(2)(A) and (B).

[72] Robertson, B., M. Mousavian. 2022. *The Carbon Capture Crux: Lessons Learned*. p. 77-78. *available at:* https://ieefa.org/media/3007/download/.

[73] Ameren IRP, Chapter 6, p.23.

demonstrated as an emission reduction practice.[74] In fact, Ameren also cites to the Boundary Dam Unit 3 example, noting that "[c]ontrary to EPA's claim, Boundary Dam Unit 3 hardly demonstrates that CO_2 capture at 90% has been adequately demonstrated."[75] In addition, Ameren highlights that Missouri does not have any established sequestration sites, which would require the construction of "an interstate pipeline from eastern Missouri into southern Illinois, an approximate 100 mile route that would cross the two rivers (the Missouri and Mississippi Rivers) and possibly a third (the Illinois River) and cost at least $300 million to construct."[76]

Despite its own skepticism, the Company is putting forth modeling of CCS that it has argued elsewhere is too cheap and potentially infeasible. The underestimation of CCS costs and overly optimistic removal rate lead are deficiencies in the Company's IRP that must be addressed to find a more "just and reasonable" plan.[77]

V. Deficiency 11: The Company should have considered the Grain Belt Express transmission line in its modeling.

As Ameren and the Commission are aware, the Grain Belt Express transmission line has recently been approved in Missouri and other states. This line will bring 2,500 MW of high-capacity value wind and potentially solar energy to Missouri's MISO zone. At a minimum, Ameren Missouri should model purchasing a substantial portion of wind energy as a PPA from the Grain Belt line. Such a purchase would likely be cost effective and would give Ameren a

[74] Ameren Corporation, Comments to the U.S. Environmental Protection Agency in Docket No. EPA-HQ-OAR-2023-0072 (Document No. EPA-HQ-OAR-2023-0072-0660), p. 25, (Aug. 8, 2023), *available at:* https://www.regulations.gov/comment/EPA-HQ-OAR-2023-0072-0660.

[75] *Id.,* p. 27.

[76] *Id.,* p. 31.

[77] 20 CSR 4240-22.010(2).

resource that has a different production profile than local Missouri wind, and would better serve the policy goals of the IRP to provide effective and reasonable rates for ratepayers.[78]

VI. Deficiency 12: The Company should work with stakeholders to implement distributed generation programs that have federal funding.

Through programs like Direct Pay for non-profits, the Greenhouse Gas Reduction Fund, Climate Pollution Reduction Grants, and especially EPA's Solar for All program, hundreds of millions of federal dollars will flow into Missouri during the next few years to build rooftop solar and community solar. These programs will benefit the Missouri economy, the wealth of low-income Missourians, and the resilience of the electric grid in Missouri. These federal programs will provide the most benefits to Missouri if incumbent utilities like Ameren work with stakeholders to facilitate distributed solar connection to the grid. The Commission should order Ameren to update its IRP to include a discussion of how Ameren will work with the state and local agencies and other stakeholders that implementing these programs to facilitate the most benefits for Missouri.

VII. Deficiency 13: The Missouri Environmental Improvement and Energy Resources Authority ("EIERA") has applied for a Solar for All grant from U.S. EPA, and U.S. EPA will make award announcements in March 2024.

EIERA is seeking EPA funding to build 218 MW of distributed solar, benefiting nearly 19,000 low-income households in the state.[79] While some of the funding will of course be directed outside of Ameren's service area, Ameren has an important role to play in working with EIERA to assure timely connection of this significant amount of solar to its grid. This Solar for All program will not only benefit the 19,000 households who will directly receive distributed

[78] 20 CSR 4240-22.010(2).

[79] EEIRA, Solar for All Application, p. 4, *available at:* https://eiera.mo.gov/wp-content/uploads/sites/11/2023/10/Missouri-Solar-for-All-Grant-Program-Narrative-2.pdf.

solar, but all of Ameren's customers who will benefit by lower overall electric demand and increased resilience. Other state or local agencies are likely to receive grants this year to implement distributed solar projects under other federal programs. In its next IRP Annual Update, Ameren should explain how it intends to work with EIERA and other stakeholders to assure that the maximum number of distributed solar projects can be installed in its service territory to secure these economic and resilience benefits for Missouri, especially given the explicit cost-minimizing policy object of the IRP process.[80]

VIII. Conclusion

Sierra Club appreciates the opportunity to engage in Ameren's IRP process and respectfully requests that the Company agree to fix, or the Commission order the Company to fix, the deficiencies identified herein in its 2024 IRP Annual Update.

Respectfully submitted,

Dated: February 28, 2024

/s/ Sarah Rubenstein
Sarah Rubenstein
Great Rivers Environmental Law Center
319 N. 4th Street, Suite 800
St. Louis, MO 63102
srubenstein@greatriverslaw.org

Tyler Comings and Joshua Castigliego
Applied Economics Clinic, on behalf of
Sierra Club
tyler.comings@aeclinic.org
joshua.castigliego@aeclinic.org

Sunil Bector
Senior Attorney
Environmental Law Program
Sierra Club
sunil.bector@sierraclub.org

[80] 20 CSR 4240-22.010(2)(C).

Tony Mendoza
Senior Attorney
Environmental Law Program
Sierra Club
tony.mendoza@sierraclub.org

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was filed on EFIS and sent by email on this 28th day of February, 2024, to all parties on the Commission's service list in this case.

/s/ Sarah Rubenstein
Sarah Rubenstein