Exhibit No. 401

Office of the Public Counsel – Exhibit 401
Geoff Marke
Direct Testimony
File Nos. ER-2021-0240 & GR-2021-0241

Exhibit No.:	401
Issue(s):	High Prairie Wind Farm/ Plant-In-Service-Accounting/Cryptocurrency Mining/Keeping Current/Late Fees
Witness/Type of Exhibit:	Marke/Direct
Sponsoring Party:	Public Counsel
Case No.:	ER-2021-0240

DIRECT TESTIMONY

OF

GEOFF MARKE

Submitted on Behalf of the Office of the Public Counsel

UNION ELECTRIC COMPANY
D/B/A AMEREN MISSOURI

FILE NO. ER-2021-0240

September 3, 2021

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Union Electric Company d/b/a Ameren Missouri's Tariffs to Increase its Revenues for Electric Service	)))))	Case No. ER-2021-0240

AFFIDAVIT OF GEOFF MARKE

STATE OF MISSOURI)
) **ss**
COUNTY OF COLE)

Geoff Marke, of lawful age and being first duly sworn, deposes and states:

1. My name is Geoff Marke. I am a Chief Economist for the Office of the Public Counsel.

2. Attached hereto and made a part hereof for all purposes is my direct testimony.

3. I hereby swear and affirm that my statements contained in the attached testimony are true and correct to the best of my knowledge and belief.

Geoff Marke
Chief Economist

Subscribed and sworn to me this 3rd day of September 2021.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

TIFFANY HILDEBRAND
My Commission Expires
August 8, 2023
Cole County
Commission #15637121

Tiffany Hildebrand
Notary Public

My Commission expires August 8, 2023.

TABLE OF CONTENTS

DIRECT TESTIMONY

OF

GEOFF MARKE

UNION ELECTRIC COMPANY

D/B/A AMEREN MISSOURI

CASE NO. ER-2021-0240

I. Introduction

Q. Please state your name, title and business address.

A. Geoff Marke, PhD, Chief Economist, Office of the Public Counsel (OPC or Public Counsel), P.O. Box 2230, Jefferson City, Missouri 65102.

Q. What are your qualifications and experience?

A. I have been in my present position with OPC since 2014 where I am responsible for economic analysis and policy research in electric, gas, water, and sewer utility operations.

Q. Have you testified previously before the Missouri Public Service Commission?

A. Yes. A listing of the Commission cases in which I have previously filed testimony and/or comments is attached in Schedule GM-1.

Q. What is the purpose of your direct testimony?

The purpose of my testimony is to provide support for my recommendation to disallow costs associated with Ameren Missouri's recovery of costs related to the High Prairie Wind Farm, Plant-In-Service Accounting ("PISA") capital projects, Cryptocurrency Mining, Keeping Current (and other related income-eligible policy), and Late Fees.

II. Wind Curtailment from Excessive Take of Protected and Endangered Species

Q. How large is Ameren Missouri's High Prairie Wind Farm?

A. High Prairie is an approximately 400 MW wind generation facility consisting of 175 wind turbines in Schuyler and Adair Counties spanning more than 60,000 acres. It is my understanding that it is the largest wind generation facility in Missouri.

Q. Is the High Prairie Wind Farm operating full-time (i.e., when it is windy)?

A. No.

Q. Why not?

A. Because the High Prairie Wind Farm has killed large numbers of threatened and endangered species in a short period putting into jeopardy the continued operation of the facility.

Q. Can you provide some background?

A. According to the "Project Description and History" section of the Stantec 2021 *Spring Post-Construction Bat Mortality Monitoring Report of High Prairie Renewable Energy Center* submitted on June 15, 2021:

> Due to the potential risk of take[1] of the federally-endangered Indiana bat (Myotis sodalis) and federally-threatened northern long-eared bat (Myotis septentrionalis) during operations, Ameren applied for an Incidental Take Permit (ITP)[2] for these species, as well as for the little brown bat (Myotis lucifugus). In the interim, the Project

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[1] A **take** is a technical term, which here means: "the unintentional death of a threatened or endangered species due to the operation of a wind farm or accompanying transmission or distribution lines."

From Section 3(18) of the Federal Endangered Species Act: "The term **'take'** means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Threatened species is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range - - as defined in the Endangered Species Act."
Endangered species is defined as "The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range." US Fish & Wildlife Service (2021) Midwest Region Endangered Species Glossary.
https://www.fws.gov/midwest/endangered/glossary/index.html

[2] An **incidental take permit** is a permit issued under Section 10 of the United States Endangered Species Act (ESA) to private, non-federal entities undertaking otherwise lawful projects that might result in the take of an endangered or threatened species. Application for an incidental take permit is subject to certain requirements, including preparation by the permit applicant of a conservation plan. A **habitat conservation plan** (HCP) must accompany an application for an incidental take permit. The purpose of the habitat conservation planning process associated with the permit is to ensure there is adequate minimizing and mitigating of the effects of the authorized incidental take. The purpose of the incidental take permit is to authorize the incidental take of a listed species, not to authorize the activities that result in take.

operated under a Technical Assistance Letter (TAL)[3] from the U.S. Fish and Wildlife Service (USFWS).

To avoid potential effects to the Indiana bat and northern long-eared bat, the TAL required feathering[4] of all turbines below 6.9 meters-per-second (m/s) for 0.5 hour before sunset to 0.5 hour after sunrise when air temperatures were above 50°F from March 15 through October 31 based on the 10-minute rolling average at each individual turbine. Due to the fatality of a male Indiana bat at the Project in September 2020, Ameren voluntarily increased the avoidance measures to involve no operation of the turbines when temperatures were above 50°F starting on March 15, 2021. Another fatality was discovered on April 15, 2021; Ameren voluntarily stopped all night time operations starting on April 19, 2021, but continued post-construction monitoring under the TAL until the ITP was issued on May 14, 2021.[5]

To be clear, the High Prairie Wind Farm has been curtailed from before dusk to after dawn since April 19, 2021.

Q. That excerpt only covers up to mid-June. Is High Prairie still not operating at night?

A. High Prairie is still not operating at night.

Q. Did the report provide information on the amount and type of "takes" taken to date?

A. No. Only over a nine-week period (15 March – 14 May). During that period, four bat carcasses (including the endangered Indiana bat) and 52 birds were identified (including the federally

[3] A **technical assistance letter** is an informal consultation with US Fish and Wildlife Services (USFWS) in which information of a project is shared with the USFW and allows USFW to provide information on the presence and of protected species. The applicant/agency must then determine whether a project may affect identified species.

[4] **Feathering** is the force stoppage of the rotor and can be done at high or low speeds for different reasons (e.g., feathering at high speeds because it exceeds maximum rate speed; and feathering at low speeds because the probability of bats being "taken" is more likely).

[5] See GM-2.

protected bald eagle and a Virginia rail, a species of concern for the Missouri Department of Conservation).[6,7]

Q. Will there be future reports to provide insight and status on the project?

A. I would think so. Alternatively, I hope to provide the Commission with a better and more accurate overview through discovery in future testimony. The operational status of the wind farm is clearly an evolving issue.

Q. Do we have any sense of how many takes have occurred since mid-May?

A. Based on conversations with Ameren Missouri, the number of taken endangered Indiana bats has increased to the point where the USFWS has ratcheted up mitigation measures directly affecting the operation of the High Prairie wind farm. As a result, and out of an abundance of caution, Ameren Missouri has continued to curtail High Prairie at night (before dusk to after dawn) until at least Oct. 31.

A recent USFWS posting of documented Indiana bat fatalities at wind energy facilities is provided in Table 1 with a map of the location of all documented Indiana bat fatalities in Figure 1. According to this information, Ameren Missouri's High Prairie Wind Farm is responsible for 32% of all recorded wind farm related Indiana bat fatalities to date in the United States and it has only been in operation approximately one year with at least 25% of that time (at night) in full curtailment.[8]

[6] Bat carcasses include an Eastern Red Bat, Silver-haired Bat, Indiana Bat and an Unknown (Big Brown bat or Hoary bat).
[7] Bird carcasses include (but are not limited to): 10 Red-Tailed Hawks; 7 European Starlings, 6 Turkey Vultures, 3 Golden-crowned Kinglets, 3 Rough Legged Hawks, 3 Horned Larks, 2 Ruby-Crowned Kinglets, and a Killdeer. Four additional carcasses could not be identified at the species level.
[8] Pruitt, L & M. Reed (2021) Indiana Bat fatalities at wind energy facilities. US Fish & Wildlife Service. Midwest Region. https://www.fws.gov/midwest/wind/wildlifeimpacts/inbafatalities.html

Table 1: Documented Indiana bat fatalities at wind energy facilities to date (High Prairie highlighted)[9]

State	Estimated Date of Death	Sex	Age	Habitat Description
Indiana	September 8-9, 2009	Female	Adult	93% agricultural land use; less than 1% forest
Indiana	September 17, 2010	Female	Adult	93% agricultural land use; less than 1% forest
Pennsylvania	September 25, 2011	Female	Young of Year	Primarily forested area
West Virginia	July 7, 2012	Male	Adult	Forested Ridgeline with a few wetland resources (small streams and wetlands along the ridgeline)
Ohio	October 2-3, 2012	Female	Adult	Crop land and developed land are 98% of project area
Ohio	October 7-9, 2013	unknown	Adult	Crop land and developed land are 98% of project area
Ohio	April 13-14, 2014	Female	Adult	Crop land and developed land are 98% of project area
Indiana	August 23, 2015	unknown	unknown	88% agricultural land use; 6% forest
Iowa	July 13, 2016	unknown	unknown	89% agricultural land use; 5% forest
Illinois	September 23, 2016	unknown	unknown	Crop land and developed land are 92% of project area
Indiana	July 2017*	unknown	unknown	88% agricultural land use; 6% forest
Indiana	May 1,2018	unknown	unknown	87.5% agricultural land use; 6.5% forest; 5% developed
Indiana	September 17, 2018	male	unknown	87.5% agricultural land use; 6.5% forest; 5% developed
Indiana	September 18 ,2019	unknown	unknown	88% agricultural land use; 6% forest
Iowa	September 1, 2020	Male	Adult	corn/soybean agriculture
Iowa	September 10, 2020	unknown	unknown	corn/soybean agriculture
Missouri	October 2, 2020	Male	unknown	79% agricultural/pasture land use; 21% forest
Indiana	October 9, 2020	unknown	unknown	88% agricultural land use; 6% forest
Ohio	October 13, 2020	unknown	unknown	Crop land and developed land are 98% of project area
Missouri	April 15, 2021	Female	Adult	79% agricultural/pasture; 21% forest
Missouri	May 28-June 2, 2021	Female	Adult	79% agricultural/pasture, 21% forest
Missouri	May 28-June 3, 2021	Male	Adult	79% agricultural/pasture; 21% forest
Missouri	May 28-June 2, 2021	Female	Adult	79% agricultural/pasture; 21% forest
Missouri	June 4-June 8, 2021	Female	Adult	79% agricultural/pasture; 21% forest
Missouri	June 10-June 14, 2021	Male	Adult	79% agricultural/pasture; 21% forest
Missouri	June 10-June 14, 2021	Male	Adult	79% agricultural/pasture; 21% forest
Missouri	June 17-June 21	unknown	Adult	79% agricultural/pasture; 21% forest
Indiana	August 3, 2021	unknown	unknown	88% agricultural land use, 6% forest
Indiana	August 23, 2021	unknown	unknown	82% agricultural land use; 8% forest; 5% developed
Indiana	August 25, 2021	Male	unknown	88% agricultural land use; 7% forest

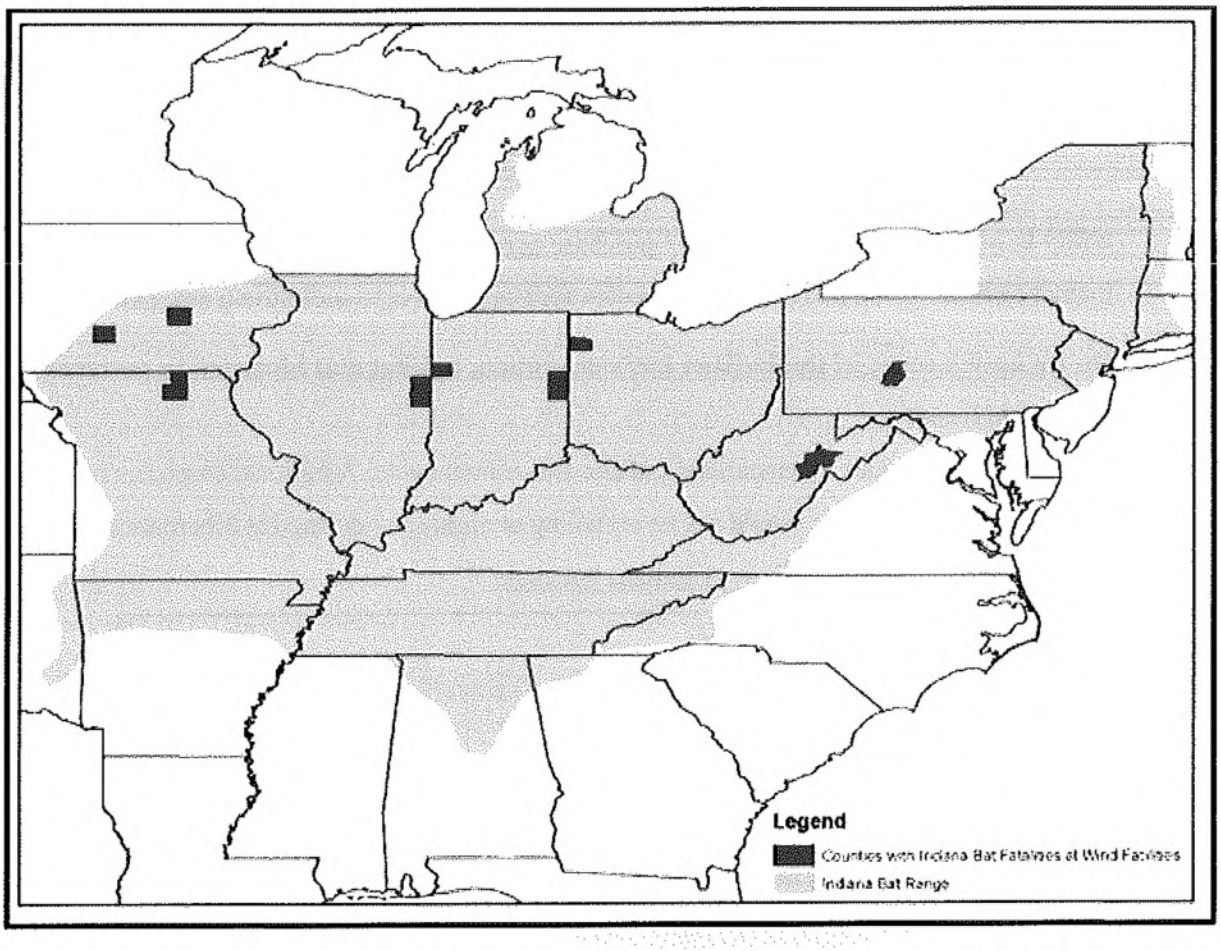
High Prairie Wind Farm

High Prairie Wind Farm

*high uncertainty in estimated date of death; advanced decomposition of carcass when found on August 10

[9] Ibid.

Figure 1: Location of documented Indiana bat fatalities at wind facilities[10]



I cannot speak to any other bird or bat species take numbers to date, but will update accordingly in future testimony.

Q. Are you confident that these numbers accurately represent all of the bird and bat species deaths the High Prairie wind farm has caused?

A. No. Nor would one reasonably expect to collect all of the carcasses generated from a 400 MW wind farm that stretches across 60,000 acres of land. My understanding is that statistical samples of set plots and times are conducted to provide a probability score, which is then

[10] Ibid.

translated into an assumed take rate at a later date by the USFWS. If Ameren Missouri exceeds that, further mitigation efforts could be enforced.

Q. Is it unusual to only operate a wind farm during part of the year?

A. Yes. Properly sited wind farms should not have forced curtailments that are in effect for prolonged periods of time. I am aware of no wind farm either operated by an investor owned-utility in Missouri or through a power purchase agreement that has produced this sort of fatal impact on endangered and threatened species nor been subject to such strong mitigation action.

Q. Do we have a sense of the Indiana bat's migration, habitat and hibernation patterns on an annual basis?

A. Yes. Figure 2 provides a generalized Indiana Bat annual cycle. Additional emphasis has been placed when High Prairie would not be curtailing at night (i.e., during bat hibernation).

Figure 2: Generalized timing of Indiana of Indiana bat cycle [11]

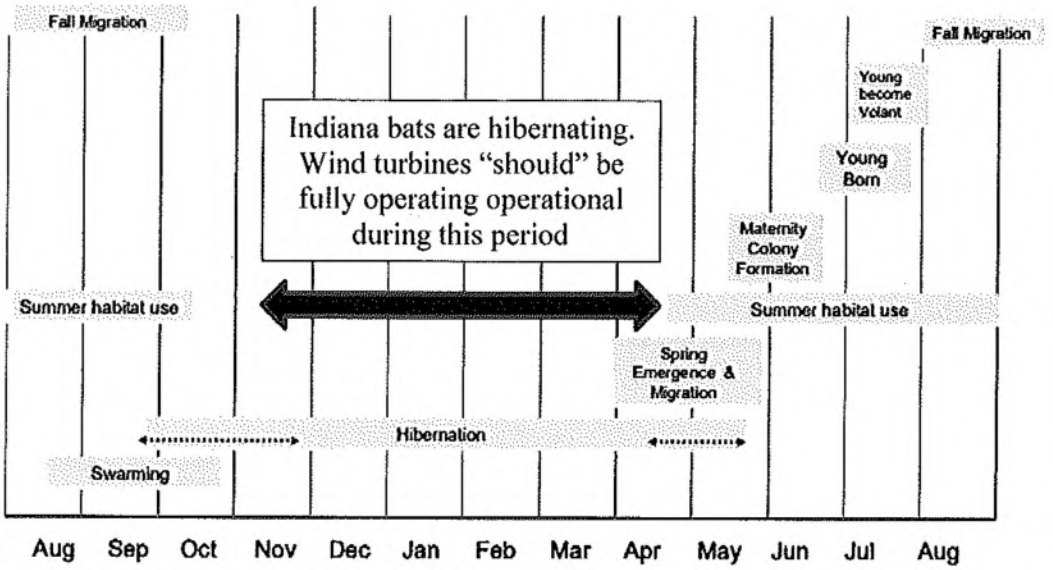


Figure 3. Generalized Indiana Bat Annual Chronology

[11] Herrington, K. (2021) Biological Opinion and Conference Opinion on the U.S. Fish and Wildlife Service's approval of a Habitat Conservation Plan and the issuance of an associated Endangered Species Act Section 10(a)(1)(B) Permit (High Prairie Wind Energy Center, Adair and Schuyler Counties, MO, TAILS No. 03E14000-2016-TA-1577).US Dept. of Interior https://ecos.fws.gov/docs/plan_documents/bobs/bobs_3351.pdf

Q. Are there recommendations on siting wind farms to mitigate the impact on endangered bats?

A. Yes. The 2021 Nature Conservancy's report, "Site Wind Right: Accelerating Clean, Low-Impact Wind Energy in the Central United States" cites to a 2016 USFWS report that recommends to avoid wind development within 32 km of Indiana bats priority 1 hibernacula, 16 km of priority 2 hibernacula, and 8 km of other current and historical sites including bat roosts.[12] Known bat roosts have been plotted by the Nature Conservancy on Figure 3 for US-specific bat roosts:

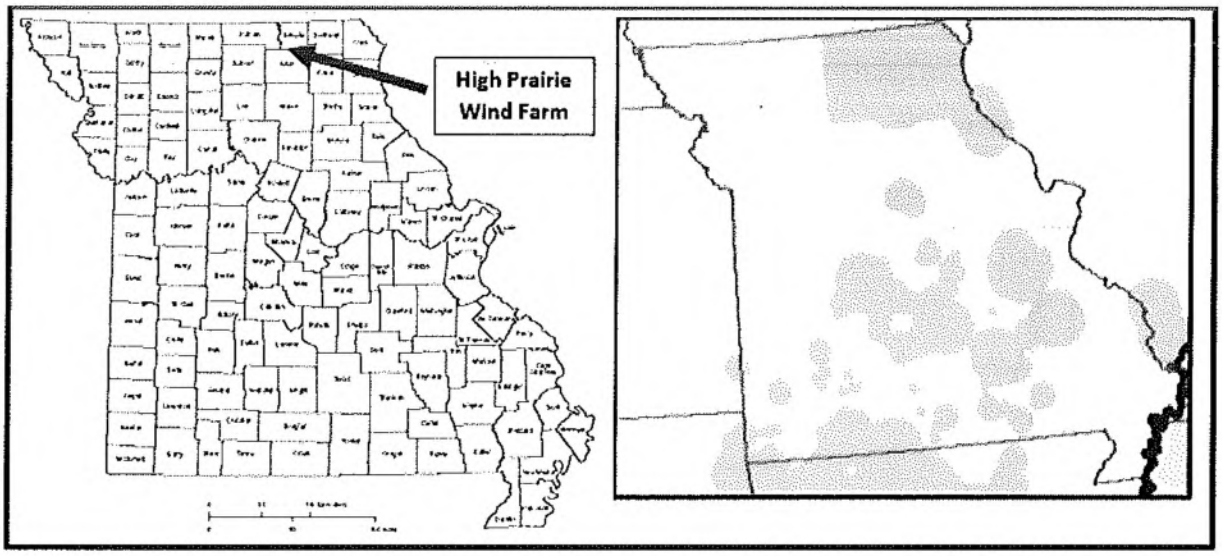
Figure 3: US-specific bat roosts [13]

[12] Fuhr, M. et al. (2021) Site Wind Right: Accelerating Clean, Low-Impact Wind Energy in the Central United States: Bat roosts https://www.nature.org/content/dam/tnc/nature/en/documents/SWR_Methods_20190703.pdf
[13] Ibid.

Q. Are Schuyler and Adair counties (where High Prairie Wind Farm is located) in known bat roosts areas?

A. Yes. Figure 4 enhances the Nature Conservancy's report to focus on Missouri and additional emphasis has been added to indicate the locations of Schuyler and Audrain counties.

Figure 4: Missouri-specific bat roosts



Q. Did anyone bring up the future liability of Ameren Missouri taking ownership of a farm on a location associated with endangered species?

A. Yes. I filed rebuttal and surrebuttal testimony in Case No: EA-2019-0202 along with Dr. Kathryn Womack (Bat expert), Dr. Janet Haslerig (Eagle expert) and Missouri Department of Conservation Policy Coordinator Jennifer Campbell advising the Company against the siting of High Prairie and liability inherent of that specific location in relation to both the Indiana bat and bald eagles.

Q. You mentioned that High Prairie has also taken a bald eagle. Is Ameren pursuing an ITC for bald eagles as well?

A. Yes and golden eagles. If High Prairie were to somehow take an excessive amount of those federally protected species it may run the risk of curtailment during the day as well.

Q. Did the USFWS advise against operating a wind farm at the High Prairie location?

A. It is not clear to me what USFWS position was on Ameren Missouri operating a wind farm at this location. I will update that as I obtain further information. I do know that USFWS cannot prevent a wind farm from being built. It can only enforce punitive action if said farm is in violation of the law.

Q. What other concerns do you have regarding High Prairie?

A. I am concerned that the Company may not meet its Renewable Energy Standard ("RES") requirement due to the excessive take of protected species. As such, I do not believe ratepayers should be responsible for any costs related to Ameren's poor managerial decisions in electing to site its wind farm where it did. I do not know whether or not this specific facet will be germane to this proceeding or a future RESRAM filing; however, I would like to bring it to the Commission's attention nonetheless.

Q. What is your recommendation to the Commission?

A. At this point, I feel like any recommendation is premature as I am still collecting and analyzing data and records. As it stands, I would recommend that 25% of the costs related to the High Prairie Wind Farm be removed from the revenue requirement to account for the fact that High Prairie is only operational 75% of the year. However, I reserve the right to amend this based on new information, discovery, and further analysis.

III. Plant in Service Accounting ("PISA")

Accountability

Q. Did you express concerns regarding accountability of PISA investments in Ameren Missouri's last rate case?

A. I did. In my rebuttal testimony in Case No: ER-2019-0335 I testified as follows:

> **Q. What is your response to Mr. Wood highlighting future grid upgrades as a customer driven focus within Ameren Missouri's Smart Energy Plan?**

A. What are the quantified benefits? Where are the cost-benefit ratios and analysis? What are the performance measures? Where is the risk-informed distribution project evaluation or prioritization?

To date, there has not been a single performance measure offered. No reliability metrics, no O&M savings, no demand response savings, nothing. Instead, the Commission was given a filing that contained a list of projects and a seven-page "report" without any historic or accountable metrics.

I have not seen one cost-benefit analysis on any of the projects. I would, for example, be very interested in how Ameren Missouri has determined it is cost-effective to underground over 300 miles of its distribution system after its most recent IRP said:

> 22% of the [distribution system] lines are underground which provide a more aesthetically pleasing experience and are less susceptible to weather **but cost significantly more and take longer to fix.**[14] (Emphasis added).

Or how 4kV substation replacement programs will deliver positive benefit-cost ratios or why the Plan omits any Conservation Voltage Reduction when Ameren Illinois estimated a 1.5% drop in energy use from their investment.[15]

Q. Could you provide some illustrative examples of metrics you would like to see?

A. Literally anything would be a good start.

Beyond what I referenced already, one illustrative example could be Ameren Missouri's historic and projected (2013 to 2023) distribution rate base dollar per customer amount against the Company's historic and projected energy sales and system peak and how those numbers compare with US IOU averages. These

[14] EO-2018-0038 Chapter 7 Transmission and Distribution pp. 17-19.
[15] See GM-3.

metrics could be cross referenced with SAIDI, SAIFI, and CAIDI scores to show whether previous distribution investments produced meaningful results.

In short, I would want to see some (or any) justification that ratepayers $5 billion + spend on "customer-driven focus" distribution investments will result in customer benefits and not just gold plating a utility's distribution system. Certainly, PISA accounting treatment can produce benefits beyond paperless billing.

The lack of transparent, robust quantitative data is especially disconcerting given the uncertainty surrounding Ameren Missouri's baseload coal plants, which, separate and aside from PISA, may induce billions of dollars in additional investments. Unfortunately, I have little assurance on that issue as well as the Company never modeled such a scenario in its IRP.[16]

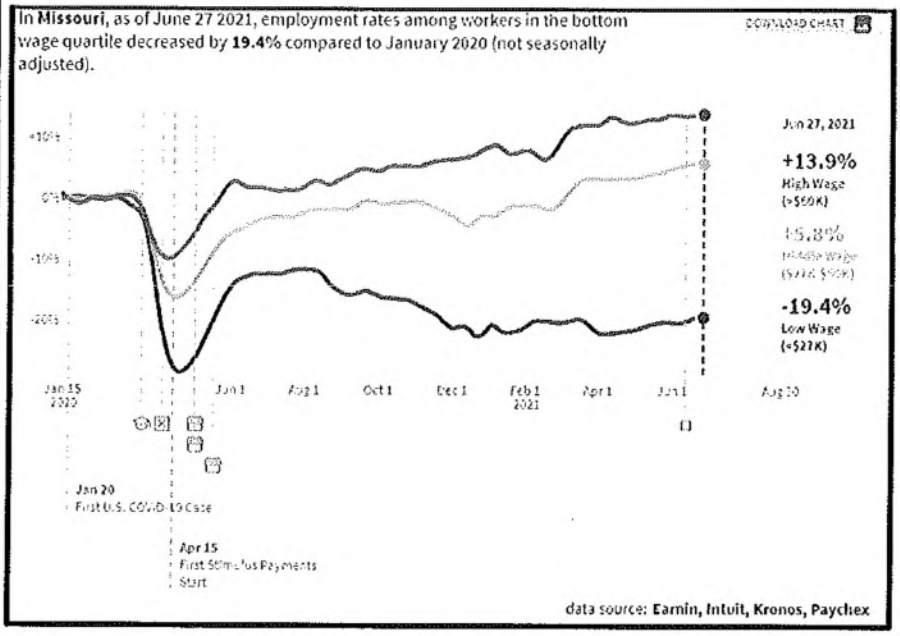
Q. Has anything changed since Ameren Missouri's last rate case?

A. No, not as far as any meaningful actions on Ameren Missouri's part to provide accountability or transparency regarding its PISA investments. I am aware of zero cost-benefit studies that support Ameren Missouri's PISA investments, nor have I seen a single proposed metric to support performance accountability or managerial prudence.

The lack of cost-benefit studies and performance accountability metrics aside, a global pandemic and economic recession both occurred since Ameren Missouri's last rate case. The impact and subsequent recovery has been uneven across its service territory. This is illustrated in Figures 5 and 6, which shows how employment and consumer spending have changed from pre-COVID-19 onset through this summer for Missouri.

[16] ER-2019-0335 Rebuttal Testimony of Geoff Marke p. 5, 12-23 to p. 6.

Figure 5: Percent Change in Employment as of June 27, 2021[17]



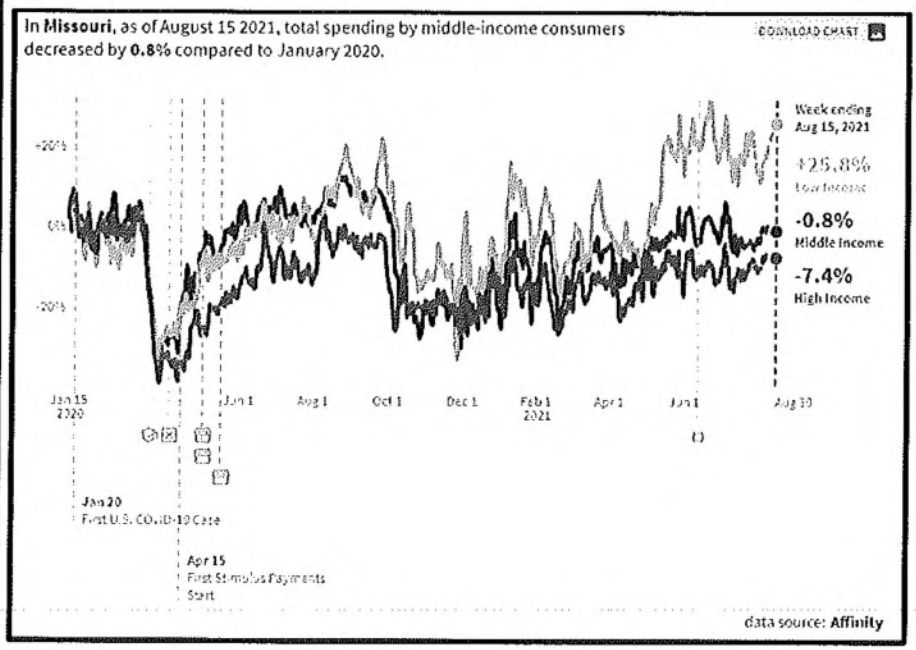
June 27, 2021

+13.9% High Wage (>$60K)

+5.8% Middle Wage ($27K - $60K)

-19.4% Low Wage (<$27K)

Figure 6: Missouri Consumer spending by income as of August 15, 2021[18]



June 27, 2021

+25.8% Low Wage (<$27K)

-0.8% Middle Wage ($27K - $60K)

-7.5% % High Wage (>$60K)

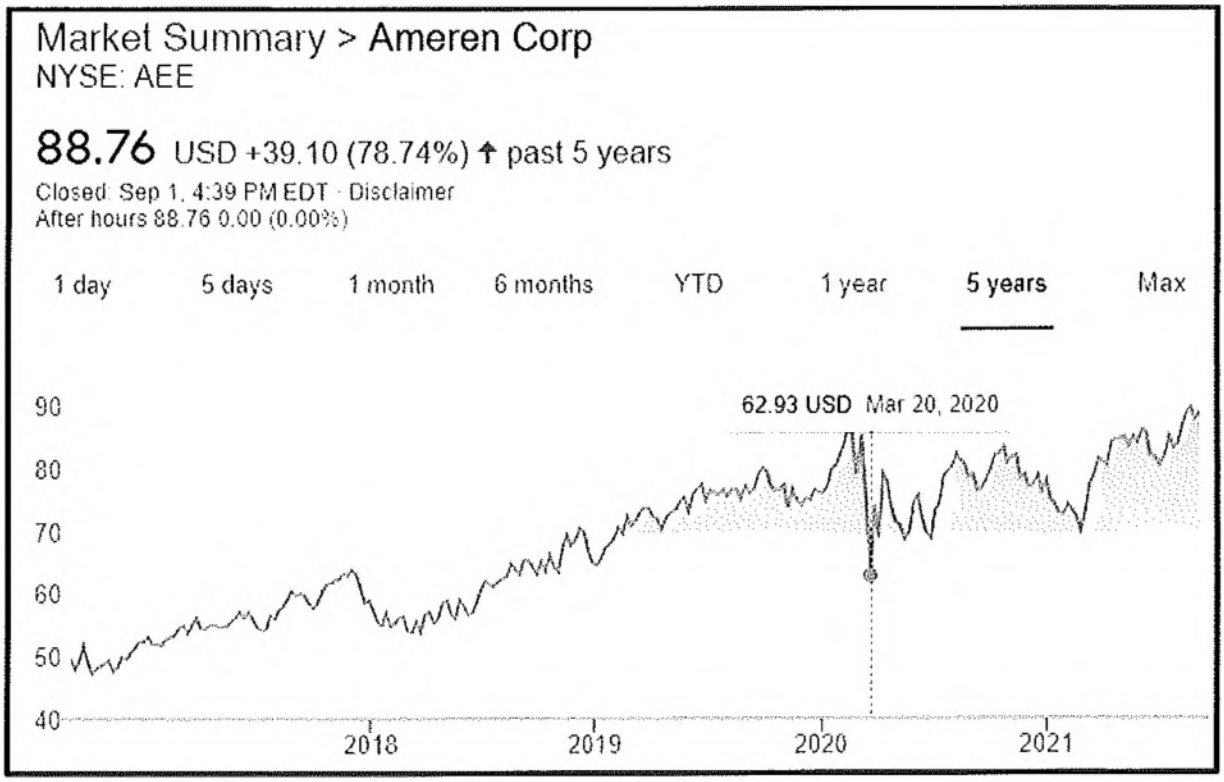
[17] Opportunity Insights: Economic Tracker (2021)Missouri https://www.tracktherecovery.org/
[18] Ibid.

Q. What do these tables show?

A. That low-income consumers (<$27K per year) have seen employment rates decrease 19.4% since January of 2020 and consumer spending increase 25.8%.[19] Clearly, there are various conclusions that can be drawn from this data; but I point out that low wage low employment rate and increased low wage consumer spending cannot be sustained, and imposing a double-digit rate increase on the essential service of electricity now could profoundly impact Ameren Missouri's most vulnerable customers.

Not all have suffered from the global pandemic and recession. Ameren Missouri's parent, Ameren, saw its stock valuation drop to a low of $62.93 in March of 2020, then has rebounded + 41% to $88.76 through the COVID-19 pandemic as of Sept. 1, 2021 as shown in Figure 7.

Figure 7: 5-year Ameren Corp. Market Summary



[19] Franck, T. (2021) July consumer prices jump 5.4% but core inflation rises less than expected. *CNBC.* https://www.cnbc.com/2021/08/11/cpi-report-july-2021.html

Q. What do you recommend regarding Ameren Missouri's capital expenditures?

A. First, I hope that Ameren Missouri responds to my testimony with both cost-benefit analyses of its PISA capital investments and with reasonable performance metrics to benchmark its success in addressing the problems they are attempting to solve through their billion dollar investments.[20] Absent that, I recommend the Commission consider these omissions in light of Ameren Missouri's case-in-chief when examining the prudency of Ameren Missouri's investments laid out in Staff's Cost of Service Report and in setting Ameren Missouri's return on equity. Furthermore, I encourage the Commission to order Ameren Missouri to provide this information now and in its open PISA docket Case No: EO-2019-0044.

It is my understanding that the PISA legislation may be renewed for another five years in the near future. I find it troubling that renewing this legislation would be taken seriously when regulators and advocates cannot convincingly explain what issues the first few years of capital investment solved.

Voltage Optimization Plan

Q. What is Voltage Optimization?

A. Some utilities overpower homes and businesses with more voltage than is needed. This is a symptom of inefficiencies in the electric system that can negatively impact people's wallets, health, and the environment. If voltage were "right-sized," customers would only get the power they need to sufficiently power their appliances and devices, while building a cleaner, more efficient electricity system in the process. Voltage optimization is an electrical energy saving technique to support efficient distribution investments.

Q. Do you support voltage optimization as Ameren Missouri grid investments via PISA?

A. Yes. I also strongly recommend the Company provide rebuttal testimony as to why it has not included a voltage optimization plan similar to that of its affiliate Ameren Illinois in its smart grid investments.[21] If the Company continues to ignore my arguments, I recommend that the

[20] Benchmarks beyond merely increasing CAPEX year-over-year.
[21] See GM-3.

Commission order Ameren Missouri to respond and consider why such "low hanging" and seemingly highly efficient investments (especially if targeted at low and moderate income households) have not been included to date in its PISA investments.

At a minimum, I advise the Commission to review GM-4 which includes an actual plan and cost-benefit analysis of the planned capital investment for Ameren Illinois. I strongly encourage Ameren Missouri to review said document as a reasonable template for the sort of analysis that I expect to be undertaken before executing PISA investments. Such an analysis would be considered prudent management. The lack of such an analysis calls into question the prudency of any investment.

IV. Cryptocurrency Mining

Q. Is Ameren Missouri exploring cryptocurrency for its regulated services?

A. Yes. In Ameren Missouri's most recent fuel adjustment filing ("FAC") in Case No: ER-2022-0026 Company witness J. Neil Graser prefiled testimony requesting $8,042 in cost deferrals and stating the following for support of that request:

> This small increase arose from electricity consumed for a research and development project being conducted near the Sioux Energy Center. The project is evaluating flexible data centers to determine whether, among other things, they can be operated as a dispatchable resource supporting the network's stability or delivering other benefits to the grid. These data centers may also provide new revenues (e.g., by **producing digital assets**) that if put into day-to-day operation in providing service could be used to contribute to affordability of service. (Emphasis added). [22]

Q. That testimony does not contain any reference to cryptocurrency. How did you learn that cryptocurrency is related to the R&D project?

A. It was revealed through a recent phone conference between OPC, Staff and the Company that "producing digital assets" is a roundabout way to say "mining for Bitcoin."

[22] ER-2022-0026 Direct Testimony of J. Neil Graser p. 5, 13-19.

Q. Please explain.

A. It is my understanding that Ameren Missouri is utilizing a storage center housed with high-powered computers adjacent to the Sioux Energy Center where it is actively mining for Bitcoin. The Company has framed this endeavor as a research and development ("R&D") study in demand response. That is, the R&D investment—the high-powered computers and storage center housing the computers can be "turned off" on a moment's notice during peak hours; thus, it is a demand response asset. It is less clear how the cryptocurrency would translate into lower rates for customers or what would happen if the endeavor results in excess costs to customers.

Q. Are any of the capital investments from this "R&D" project in the Company's case-in-chief?

A. Not to my knowledge.

Q. Then why are you raising this issue?

A. Because Ameren Missouri apparently intends for its customers to pay for the electricity used at these data centers through its fuel adjustment clause. Also out of an abundance of caution to make sure this issue is fully vetted before the Commission should/when these costs appear later in "true-up" I have elected to address this in direct testimony to give Ameren Missouri (and other parties) ample time to respond.

Q. What is your opinion regarding how to treat these cryptocurrency mining costs?

A. I recommend that no cost related to the Company's cryptocurrency endeavors be included in rate base and/or funded with ratepayer backing, including the electricity consumed. If Ameren Missouri wants to enter into speculative commodities, like virtual currencies, then it should do so as a non-regulated service where ratepayers are unexposed to the economics of them. This endeavor is beyond the scope of intended electric utility regulation, and, if allowed, creates a slippery slope where ratepayers could be asked to put up capital for virtually anything. I believe this is a straightforward enough and obvious argument that I need not expound further, but if the Company (or other parties) feel differently, I will gladly provide more rationale in

surrebuttal testimony for why captive Missouri ratepayers should not be funding non-essential gambles on the commodities market. I merely request Ameren Missouri make its case in rebuttal testimony if it believes it *may* include costs related to its R&D project in true-up or confine cryptocurrency mining to its non-regulated services.

V. Keeping Current

Q. What is Ameren Missouri's Keeping Current program?

A. Introduced in October 2010, the purpose of the Keeping Current Low-Income Pilot Program (Keeping Current) is to provide electric bill payment assistance to customers meeting the eligibility requirements (150% or below federal poverty level) while assessing the delivery methods used in this program and the impacts on Ameren Missouri's revenues and costs. Keeping Current has three (3) categories of participants:

A. Participants in the Keeping Current Electric Heating Program category –
Limited to electric space heating customers on the Residential Service Rate 1(M) who have an income level at or below 150% of the Federal Poverty Level ("FPL") enrolled by a program agency designated by the Company.
Eligible participants receive $60 to $90 monthly bill credit.

B. Participants in the Keeping Current Non-Electric Heating Program category –
Limited to non-electric space heating customers on the Residential Service Rate 1(M) who have an income level at or below 150% of the FPL enrolled by a program agency designated by the Company.
Eligible participants receive $35 to $40 bill credit June through August.

C. Participants in the Keeping Current Cooling Program category –
Limited to electric space cooling customers on the Residential Service Rate 1(M) who are either 1) elderly, 2) disabled, 3) have a documented chronic medical condition, or 4) live in households with one or more children five (5) years of age or younger and the customer in one of these categories has an income that is no more than 150% of the FPL enrolled by an agency designated by the Company.

Eligible participants receive a $25 bill credit June through August.

Importantly, the Keeping Current eligibility threshold was modified during COVID-19 to expand from 150% FPL to 200% through December 31, 2021. The Keeping Cool eligibility threshold was modified during COVID-19 to expand to from 150% FPL to 250% through December 31, 2021.[23]

To date, there have been four process and impact evaluations and one bill payment assistance design study report completed by a third party evaluator, Applied Public Policy Research Institute for Study and Evaluation ("APPRISE").[24]

Q. What was the outcome of the Keeping Current program from Ameren Missouri's last rate case?

A. In Case No. ER-2019-0335, parties entered into a non-unanimous stipulation and agreement in which the total budget for Keeping Current was increased from $1.3 million to $2 million, with a 50/50 ratepayer/shareholder funding sharing mechanism for the entire budget.[25] Additionally, Ameren Missouri agreed to contract out a third-party study of the program consistent with the recommendations made in my testimony in that case.

Q. Have any other significant events occurred since the last rate case that have impacted the Keeping Current program?

A. Yes. As a result of the ongoing COVID-19 pandemic and economic recession:

1.) There was a moratorium on disconnections (for a brief period);[26]

2.) More than $7.5 million dollars in shareholder contributions for bill assistance;[27]

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[23] See GM-5 for a breakdown of family size by income eligibility for various benefits programs.
[24] See GM-6 for a copy of the APPRISE Bill Payment Assistance Design Study Report
[25] It is important to note that Ameren Missouri's tariff does not reflect the ordered non-unanimous stipulation and agreement and needs to be amended as soon as possible.
[26] Ameren Missouri began its disconnection moratorium on March 16, 2020 and resumed disconnections in August 2020. Ameren Missouri also temporarily put in a disconnection moratorium during the holiday season 2020-2021.
[27] Approximately $7 million in "below-the-line" funds as a result of a settlement agreement with OPC and Ameren Missouri were originally intended for Community Action Agencies' weatherization efforts. Due to the inability to weatherize homes due to possible exposure to the COVID-19 virus it was agreed that these funds would be redirected for Ameren Missouri's Clean Slate Program. An additional $500K "below-the-line" funds were made available to current and former T.E.H. Realty tenants prior to the COVID-19 pandemic. It is my understanding that Ameren

3.) Additional funding from the federal government made available for low income arrearages;[28] and

4.) Eligibility modifications to the Keeping Current program to expand the programs reach to households above the 150% FPL threshold as well as funding for a program advocate/director.

Q. Can you provide a summary of the results of the "needs assessment" section of the APPRISE study on Ameren Missouri's service territory?

A. The needs assessment highlighted the following insights as it pertains to Ameren Missouri's service territory:

- Most households heat with non-electric service. Electric heating customers were more likely to have income at lower FPL[29]
- The mean energy burden ranged from 4% for households between 250 and 300 percent FPL to 19% for households at or below 100 percent of FPL[30]
    - The mean energy burden was consistently higher for electric space heating homes
- 10% of households (approximately 107,712) in Ameren Missouri's service territory had income at or below 100% ($26,500 family of four)
- 17% of households (approximately 183,110) in Ameren Missouri's service territory had income at or below 150% ($39,750 family of four)[31]

Missouri provided additional funds above and beyond what was agreed to from the 2nd non-unanimous stipulation and agreement in Case No: ER-2019-0335.

[28] See also the Missouri Housing Development Commission's ("MHDC") State Assistance For Housing Relief ("SAFHR") website: https://www.mohousingresources.com/safhr which includes $323,694,749.30 for rental, mortgage and utility assistance. As of this writing, 8/30/2021, MHDC has awarded $75.3M. https://www.mohousingresources.com/ & https://8b7cf04e-2de3-4caf-8acf-bef3e9f9fd73.filesusr.com/ugd/8ff70b_6928d6bc7de3488d9a202631283c6951.pdf

[29] Non-electric heating especially prevalent among low-income households in the St. Louis area, northeast Missouri and St. Charles.

[30] Energy burden is defined as the percentage of gross household income spent on energy costs. According to DOE's Low-Income Energy Affordability Data (LEAD) Tool the national average energy burden for low-income households is 8.6%, three times higher than for non-low-income households which is estimated at 3%. In Ameren Missouri's service territory it is approximately five times higher for non-low-income households. US DOE. (2021) Low-income Community Energy Solutions. https://www.energy.gov/eere/slsc/low-income-community-energy-solutions

[31] Households at or below 150% of poverty levels were more heavily concentrated in southeast Missouri, the city of St. Louis and northeast Missouri

- 36% of these households (65,920) had children under 18
- 31% of these households (56,764) had a member over 62
- 39% of these households (71,423) had a disabled member

- 1.2% (2,197) of households at or below 150% in Ameren Missouri's service territory participate in Keeping Current[32]

The Commission should note that these numbers are most likely affected by the economic fall-out and subsequent federal and utility response to the COVID-19 pandemic. I believe the numbers represent a reasonable assurance of the program's current and potential targeted demographics.

Q. What modification did APPRISE recommend to Keeping Current?

A. Key recommendations for various program design parameters are summarized below by category:

1. Administration: Ameren Missouri should continue to administer Keeping Current with assistance from the agencies on outreach, intake, and data management.
2. Outreach: Ameren Missouri should conduct additional outreach for Keeping Current through agencies and their own call center representatives.
3. Intake: Agencies should continue to encourage customers to visit offices for in-person Keeping Current intake but should also provide flexibility to customers who are unable to visit the office.
4. Income Eligibility: Ameren Missouri should maintain the current income eligibility level of 150 percent of the FPL. They should base eligibility on one month of income to ensure that customers who recently became unemployed due to COVID-19 are eligible.
5. Other Eligibility Requirements: Ameren Missouri should continue the following additional eligibility requirements.
   - Weatherization: Apply for the program.

[32] Keeping Current is targeted at those households who agencies feel will be able to make their monthly payments, remain on the program, and receive arrearage forgiveness

- LIHEAP: Apply for the program (continued) and apply benefits to Ameren Missouri bill if an Ameren Missouri gas or Ameren Missouri electric heating customer (new).
- Consistent Bill: Enroll in budget billing (in the absence of a new Percentage of Income Program that provides a fixed monthly bill)

6. Additional Populations: Ameren Missouri should consider enhanced benefits for formerly homeless customers to help them pay off past balances and open a new Ameren Missouri account.
7. Recertification: Ameren Missouri should continue to require participants to re-certify their eligibility every two years. This will be especially important if they move to a Percentage of Income Payment Program ("PIPP").
8. Enrollment Level: Ameren Missouri and its approved agencies should provide additional outreach as discussed above to reach more customers with this program.
9. Bill Subsidy Determination: Ameren Missouri should consider moving to a PIPP to provide participants with a fixed energy burden at an affordable level.
10. Target Energy Burden: Ameren Missouri should consider targeting a three percent energy burden for alternative electric heat participants and a six percent energy burden for electric heat participants. If the cost of these energy burden targets is beyond a target program budget, Ameren Missouri should consider a somewhat higher energy burden to reduce costs.
11. Minimum Payments and Maximum Credits: Ameren Missouri should consider a minimum monthly payment and a maximum annual credit to limit program costs. Customers who reach the maximum annual credit should be targeted for weatherization.
12. Arrearage Forgiveness: Ameren Missouri should continue the arrearage forgiveness program. We recommend that forgiveness be provided for bills that are made up following the initial bill due date. Participants should receive education so that they understand that this is an important benefit of the program.

13. LIHEAP: Ameren Missouri and its approved agencies should provide additional education and outreach to ensure that participants apply for LIHEAP assistance. They should send reminders to participants to re-apply to LIHEAP and emphasize that participants can receive benefits from both LIHEAP and Keeping Current at the same time.
14. Energy Efficiency: Ameren Missouri should prioritize high usage Keeping Current participants for weatherization. It should educate landlords about the program and encourage landlords to provide authorization for program measures
15. Program Removal: Participants are currently removed from Keeping Current if they are not current within two billing cycles. Apprise recommends that customers remain on Keeping Current as long as they remain customers and are not terminated due to nonpayment. APPRISE also recommends that customers receive monthly bill credits for all made up past due monthly bills.

Q. Do you agree with APPRISE's recommendations?

A. In part. Many of the recommendations are already in place (intake, outreach, recertification, etc…). Other recommendations, including the Bill Subsidy and Target Energy Burden sections, require further consideration before I would endorse them. That being said, I have three specific modifications from the APPRISE study I would like to endorse moving forward. They are:

1.) Additional populations: Presently, the Keeping Current/Cool programs focus on income-eligible households and elderly populations. I support the APPRISE Study's suggestion to consider targeting customers who are formerly (or in the process of no longer being) homeless. I will speak more about the design of this proposed pilot later in this testimony.

2.) Minimum Payments: I recommend the Keeping Current tariff be modified to allow customers to receive a Keeping Current benefit despite two non-payments and/or up to four payments of a minimum of $25 for up to four consecutive billing cycles. The current tariff allows for removal only after non-payment of two consecutive billing cycles. The $25 is slightly more than the average (mean) minimum payment threshold identified in the APPRISE

literature review and the four consecutive business billing periods is a reasonable extension of the current two consecutive cycles.

3.) Non-Payment: I support the APPRISE recommendation that the tariff be modified to allow Keeping Current participants to remain in the program as long as they are not terminated due to nonpayment. I do not believe this would apply to many customers; however, I could see a compelling case if the customer (for unusual reasons) has not been terminated for non-payment then they should not be removed from the program.

Q. In APPRISE's literature review of best practices, what program model was highlighted for Ameren Missouri?

A. APPRISE selected the PIPP framework as most appropriate/effective moving forward for Keeping Current program modification. This selection was made based on an extensive literature review of income eligible programs across utilities in the United States. Importantly, the scope, budget, goals and funding source(s) of these programs varied widely.

Q. What is the PIPP framework?

A. PIPP payments are based on a percentage of household income and are consistent year-round. For example, a PIPP could be set at 6% of your household income for each of your electric bills; the balance would then be subsidized (by the utility/ratepayers/state).

Q. What is your position regarding APPRISE's PIPP recommendations?

A. The PIPP model comes highly recommended, not only by APPRISE, but also in discussions I have had with other regulators/advocates in states that utilize such programs. However, implementation in Missouri could be challenging due to the prohibition on any unreasonable preferences or prejudices under § 393.130.3 RSMo.

Q. What are your specific recommendations regarding your proposed targeted homeless pilot program?

A. The APPRISE Study identified three non-profits as viable Keeping Current/Keeping Cool recipients including The St. Patrick Center,[33] The Haven of Grace,[34] and Gateway 180.[35] I would also extend outreach to local Veterans Assistance ("VA"), the Missouri Veterans Endeavor, and other veteran outreach efforts.

In addition to targeting formerly homeless populations, I recommend additional program flexibility to allow these former customers to open new accounts—namely, bad debt forgiveness (but also waiving the deposit fee and possibly bill credits) associated with rehousing. For this specific pilot program, I would recommend an annual budget of $500K split evenly between ratepayers and shareholders to be funded until Ameren Missouri's next rate case where it can be examined in greater detail. Any unspent funds can be directed to the Keeping Current or Keeping Cool programs respectively.

Q. Do you have any additional recommendations?

A. I have two more.

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[33] **St. Patrick Center** works with individuals transitioning out of shelters and places them into permanent housing. St. Patrick Center provides wraparound services to help these individuals maintain their current homes. While clients are not responsible for rent payments, they are responsible for utility bill payments. St. Patrick partners with Ameren Missouri and Spire Inc. to provide resources to individuals transitioning from a homeless shelter to permanent housing. Ameren Missouri and Spire both allow case managers to log into a portal system to review clients' bill histories and make pledges to prevent disconnection of services. Clients can complete an application and St. Patrick Center can perform the intake. APPRISE study p. 33.

[34] **The Haven of Grace** refers individuals to the St. Patrick Center's rapid rehousing program that provides support for individuals to quickly exit homelessness. However, they felt it would also be helpful to partner with Ameren because some of the women who have come through The Haven of Grace have had past due utility bills and would benefit from energy assistance. The Haven of Grace is potentially interested in working with Ameren to provide energy assistance to formerly homeless individuals. They reported that while clients do not reside at the shelter for very long, they remain connected through the childcare service. They felt that Ameren could increase outreach for the Keeping Current/Keeping Cooling programs among homeless shelters. APPRISE study p. 33.

[35] **Gateway180** connects homeless individuals to resources and programs that reduce housing barriers. Their rapid rehousing case manager prioritizes helping individuals to secure housing and connects these individuals to utility assistance programs. Gateway180 has spoken with Ameren but currently does not have a formal partnership. They are interested in such a partnership with their rapid rehousing program. Currently they refer clients to St. Patrick Center and the Urban League for enrollment in Keeping Current. APPRISE study p. 33-34.

I recommend that Ameren Missouri's Customer Service Reps ("CSRs") who receive calls from customers struggling to pay bills ask for consent from that customer to forward their contact information to the relevant Community Action Agency ("CAA") so that a representative from a CAA may contact them about weatherizing their home free of charge and other assistance if eligible.

I also recommend that Ameren Missouri conduct a three-year pilot program (up to $500K annually split evenly between ratepayers and shareholders) consistent with the framework Critical Needs Program agreed to in the non-unanimous stipulation and agreement in the most recent Spire rate case, Case No: GR-2021-0108.

Q. What is the Critical Needs Program?

A. In Case No. GR-2021-0108, Legal Services of Eastern Missouri recommended the funding and adoption of a pilot program modeled after Baltimore Gas & Electric's ("BG&E") Critical Needs Program ("CNP"). The BG&E program recognized that there are vulnerable customers who may not have the capacity to research and apply for assistance, negotiate reasonable payment plans, or properly navigate the application process. Yet their circumstances make them particularly vulnerable to harm if they become disconnected. In response, the CNP streamlines and expedites the processes to help customers stay connected. The pilot's initial goal was to implement immediate access to existing resource assistance (bill payment, repair, consumer protections, etc.) to customers that seek assistance in nontraditional utility CSR venues (e.g., hospitals, public and private assistance agencies, shelters, etc.). The CNP is a voluntary program that trains customer "navigators," who work in nontraditional utility CSR venues. The navigators utilize a simple form under a "fast-track" protocol that provides an expedited process that should:

- Maintain or restore utility services
- Avoid negative impacts on residents with serious medical conditions
- Address build-up of utility bill arrears
- Provide a streamlined process to complementary services

Q. Is this still a pilot program for BG&E?

A. No. The program's success lead it to becoming a statutory requirement for utilities in Maryland, and the service is now largely administered by the State's Social Service Department with additional funding through Maryland's Fuel Fund program.

Q. Wouldn't those elements (Department of Social Service and an independent funding stream) be beyond the scope of the Commission's power in this case?

A. They would; however, I am not suggesting anything more than what parties in Spire's recent rate case agreed, which was to model the initial pilot program that BG&E produced, other than for Ameren Missouri to partner with Spire and contribute an equivalent amount in funding this endeavor to maximize program efficiency.

Q. Do you have any additional information to share on this topic of critical needs customers?

A. I have spoken with BG&E representatives, and they have expressed a willingness to help Ameren Missouri and interested stakeholders with the mechanics behind such a program. I have also included attachments GM-7A through GM-7D, which provide more detail about the Maryland program as well as sample customer consent forms (both paper and internet). I recommend program financing of up to $500K annually (split 50/50 between ratepayers/shareholders) for the three-year pilot program, with regular meetings from interested stakeholders in the Keeping Current collaborative to see if equivalent success can be achieved for Ameren Missouri's customers as the BG&E pilot produced. Ameren Missouri's outreach and community engagement is already one of the best in the state. Given the existing resources, utilizing the BG&E model framework, and partnering with Spire, I believe this could produce excellent results.

Q. Can you summarize your recommendations as it pertains to low-income programs?

A. Yes. I support the following positions:

- Keeping Current/Cool minimum payment: Modify tariff to allow customers to receive a Keeping Current benefit despite two non-payments and/or up to four payments of a

minimum of $25 for up to four consecutive billing cycles (e.g., non-payment, non-payment, $25, $25; or $25, non-payment, $25, $25.; or $25, $25, $25, $25, etc…);

- Keeping Current/Cool Non-Payment: I support the APPRISE recommendation that the tariff be modified to allow Keeping Current participants to remain in the program as long as they are not terminated due to nonpayment;
- CSR Weatherization Referral: Direct Ameren Missouri's CSR's who receive calls from customers struggling to pay bills to ask for consent from that customer to forward their contact information to the relevant Community Action Agency ("CAA") so that a representative from a CAA may contact them about weatherizing their home free of charge and other assistance if eligible;
- Re-Housing & Returning Customer Pilot Program: Conduct a three-year pilot program ($500K 50/50 ratepayer/shareholder) that coordinates with non-profit shelters and VA and VA non-profit supporting agencies in clearing bad debt for former homeless customers re-housing in Ameren Missouri's service territory.
- Critical Needs Pilot Program: Conduct a three-year pilot program ($500K 50/50 ratepayers/shareholders) consistent with the framework originally designed by BG&E (known currently as the Maryland Critical Needs Program) and adopted in the non-unanimous stipulation and agreement in Spire's most recent rate case;

VI. LATE FEES

Q. What are the purported benefits associated with late fees?

A. The two arguments supporting the continued use of late fees include: 1.) greater revenue assurance (late fees offset the revenue requirement assuming the Company is not over-earning); and 2.) late fees should (theoretically) enourage timely payments.

Q. Do you support late payment fees?

A. No. I have not seen any evidence to support that late payment fees are an appropriate deterrent to non-payment, and I believe that any additional fee added to an already financially struggling customer will increase the likelihood of disconnection. I believe the threat of disconnection is

the primary deterrent to incentivize timely payments, and that Ameren Missouri should be doing everything in its power to provide an affordable service, which should include minimizing punitive charges that make it more likely for already struggling customers to fall off.

Q. Do you know of any Commissions that recently ordered elimination of late fees?

A. Yes. The Kentucky Public Service Commission ruled against their continued use in Case No: 2020-00141.[36] I am also aware that many state commissions ordered suspending late fees throughout the COVID-19 pandemic.

Q. What is Ameren Missouri's late payment fee?

A. 1.5% is added onto a customer's bill, if their bill is unpaid at the delinquent date.

Q. Do you have any recommendations to modify this amount?

A. I recommend that Ameren Missouri's late fees be lowered to match the short term debt recommendations made by OPC witness David Murray, which is 0.25% annually. Such an amount would more accurately reflect the cost of service, minimize the punitive pressure on struggling customers and still incentivize timely payments by having the "threat" of late payment.

Q. Does this conclude your testimony?

A. Yes.

[36] See GM-8

CASE PARTICPATION OF
GEOFF MARKE, PH.D.

Company Name	Employed Agency	Case Number	Issues
Union Electric Company d/b/a Ameren Missouri	Office of Public Counsel (OPC)	GR-2021-0241	**Direct:** Critical Needs Program / Late Fees
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2021-0240	**Direct:** Wind Farm (High Prairie) / Plant-In-Service-Accounting / Cryptocurrency / Advertising / EEI Dues / Keeping Current / Late Fees
Working Case: FERC 2222 Regarding Participation of DER Aggregators into the RTOs	OPC	EW-2021-0267	**Memo:** Aggregators of Retail Customers (ARCs) for Commercial & Industrial Demand Response
Evergy Missouri West & Evergy Missouri Metro	OPC	ET-2021-0151	**Rebuttal:** EV subsidies and EV charging stations
Spire Missouri Inc.	OPC	GR-2021-0108	**Direct:** AMI, Corporate Governance: Workplace Discrimination **Rebuttal:** Subsidized Natural Gas Expansion / Multi-Family Pilot / Energy Efficiency / Rate Design / Low-Income Programs **Surrebuttal:** AMI / AMI Opt-Out / Corporate Governance: Workplace Discrimination / Propane Storage / Research and Development / Bad Debt & Uncollectable / Rate Design
Empire District Electric Company /Kansas City Power & Light & KCP&L Greater Missouri Operations Company/Union Electric Company d/b/a Ameren Missouri	OPC	EO-2020-0069 EO-2020-0068 EO-2020-0067 EO-2020-0066	**Memorandum:** Impact of falling energy market prices in SPP(Metro, West, and Empire specific) / Reliable Power / Additive Manufacturing ("AM" or 3D Printing") / Virtual Power Plants / Small Modular Reactors / Combustion Turbine Conversion to Combined Cycle Units / Grain Belt Express Energy / Long Duration Storage **Memorandum:** Response to Sierra Club's Evergy Metro and West Recommendations **Memorandum:** Response to Sierra Club and NRDC's Ameren Missouri Recommendations
Missouri American Water	OPC	WR-2020-0344	**Direct:** COVID-19 / Future Test Year/ Cost Allocation Manual and Affiliate Transaction Rules for Large Water Utilities **Direct:** Rate Design **Surrebuttal:** Policy / Future Test Year / Affiliate Transactions Rule / Consolidated

			Tariff Pricing / Rate Design / Lead Line Replacement
Evergy Missouri West & Evergy Missouri Metro	OPC	EO-2020-0227	**Rebuttal:** Inefficient Management / Residential Demand Response **Surrebuttal:** Demand Response Programs
Working Case: To consider best practices for recovery of past-due utility customer payments after the COVID-19 pandemic	OPC	AW-2020-0356	**Memorandum:** Response to Staff Report on COVID-19 Past-Due Utility Customer Payments
Spire Missouri Inc.	OPC	GO-2020-0416	**Memorandum:** Notice of prudency concerns regarding natural gas Advanced Metering Infrastructure ("AMI") investment
Evergy Missouri West & Evergy Missouri Metro	OPC	EU-2020-0350	**Rebuttal:** Authorized Accounting Order for: Lost Revenues /COVID-19 Expenses / Bad Debt Expense **Surrebuttal:** Disconnection Moratorium / Arrearage Management Plans / Economic Relief Pilot Program / Outreach / Energy Efficiency / Administrative Procedures
Empire District Electric Company	OPC	EO-2020-0284	**Memorandum:** Customer Savings Plan / Stateline Combined Cycle Upgrade / DSM / COVID-19 Impact on Modeling / Executive Order on Securing the US Bulk-Power System / SPP Effective Load Carrying Capability / All-Source RFP
Evergy Missouri West	OPC	EO-2020-0281	**Memorandum:** Wind Power PPAs / DSM / COVID-19 Impact on Modeling / Executive Order on Securing the US Bulk-Power System / SPP Effective Load Carrying Capability / Utility-Scale Solar / All-Source RFP
Evergy Missouri Metro	OPC	EO-2020-0280	**Memorandum:** Wind Power PPAs / DSM / COVID-19 Impact on Modeling / Executive Order on Securing the US Bulk-Power System / SPP Effective Load Carrying Capability / Utility-Scale Solar / All-Source RFP
Empire District Electric Company	OPC	ER-2019-0374	**Direct:** Cost and Quality of Service, Stranded Asset, AMI/CIS deployment **Rebuttal:** Customer Experience / Weather Normalization Rider / Energy Efficiency / Low-Income Pilot Program **Rebuttal:** Class Cost of Service / Rate Design / Low Income Pilot Program

			Surrebuttal: Cost and Quality of Service / Reliability Metrics / Asbury Power Plant / Rate Design & CCOS / DSM Programs
Union Electric Company d/b/a Ameren Missouri	OPC	EA-2019-0371	**Rebuttal:** Solar + Storage
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2019-0335	**Direct:** Keeping Current Bill Assistance Program **Rebuttal:** Smart Energy Plan, Keeping Current, Coal Power Plants, CCOS, Rate Design, Pure Power RECs **Surrebuttal:** Coal Power Plants
Rule Making	OPC	AW-2020-0148	**Memorandum:** Residential Customer Disconnections and Data Standardization **Presentation:** Service Disconnection Data Standardization Virtual Rulemaking Workshop
Empire District Electric Company /Kansas City Power & Light & KCP&L Greater Missouri Operations Company/Union Electric Company d/b/a Ameren Missouri	OPC	EO-2020-0047 EO-2020-0046 EO-2020-0045 EO-2020-0044	**Memorandum:** Additive Manufacturing, Cement Block Battery Storage, Virtual Power Plant, Customer-Side Renewable Generation, Historical Review of energy forecasts (KCPL, GMO and Empire-Specific) and Rush Island and Labadie Power Plant Environmental Retrofits (Ameren specific)
Union Electric Company d/b/a Ameren Missouri	OPC	EA-2019-0309	**Rebuttal:** Need for the Wind Project/ Economic Valuation / Pre-Site Energy Assessment Omissions
KCP&L Greater Missouri Operations Company & Kansas City Power and Light Company	OPC	EO-2019-0132	**Rebuttal:** Response to KCPL's MEEIA application, Equitable Energy Efficiency Baseline, WattTime: Automated Emissions Reduction, PAYS, Urban Heat Island Mitigation **Surrebuttal:** Market Potential Study, Single Family Low-Income
KCP&L Greater Missouri Operations Company	OPC	EC-2019-0200	**Surrebuttal:** Deferral Accounting and Stranded Assets
Union Electric Company d/b/a Ameren Missouri	OPC	ED-2019-0309	**Memorandum:** on the "Aluminum Smelter Rate"
Empire District Electric Company	OPC	EO-2019-0046	**Memorandum:** Response to The Empire District Electric Company d/b/a Liberty Plant In Service Accounting (PISA) Report
KCP&L Greater Missouri Operations Company	OPC	EO-2019-0067	**Rebuttal:** Renewable Energy Credits
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2019-0314	**Memorandum:** Notice of Deficiency to Annual IRP Update
Rule Making	OPC	WX-2019-0380	**Memorandum:** on Affiliate Transaction Rules for Water Corporations

Working Case: Evaluate Potential Mechanisms for Facilitating Installation of Electric Vehicle Charging Stations	OPC	EW-2019-0229	**Memorandum:** on Policy Surrounding Electric Vehicles and Electric Vehicle Charging Stations
Rule Making	OPC	EX-2019-0050	**Memorandum** on Solar Rebates and Low Income Customers
Union Electric Company d/b/a Ameren Missouri	OPC	GR-2019-0077	**Direct:** Billing Practices **Rebuttal:** Rate Design, Decoupling, Energy Efficiency, Weatherization, CHP
Empire District Electric Company	OPC	EA-2019-0010	**Rebuttal:** Levelized Cost of Energy, Wind in the Southwest Power Pool **Surrebuttal:** SPP Market Conditions, Property Taxes, Customer Protections
Empire District Electric Company /Kansas City Power & Light & KCP&L Greater Missouri Operations Company/Union Electric Company d/b/a Ameren Missouri	OPC	EO-2019-0066 EO-2019-0065 EO-2019-0064 EO-2019-0063	**Memorandum:** Additive Manufacturing and Cement Block Battery Storage (IRP: Special Contemporary Topics)
Working Case: Allocation of Solar Rebates from SB 564	OPC	EW-2019-0002	**Memorandum** on Solar Rebates and Low Income Customers
Rule Making Workshop	OPC	AW-2018-0393	**Memorandum:** Supplemental Response to Staff Questions pertaining to Rules Governing the Use of Customer Information
Union Electric Company d/b/a Ameren Missouri	OPC	ET-2018-0132	**Rebuttal:** Line Extension / Charge Ahead – Business Solutions / Charge Ahead – Electric Vehicle Infrastructure **Supplemental Rebuttal:** EV Adoption Performance Base Metric
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2018-0211	**Rebuttal:** MEEIA Cycle III Application **Surrebuttal:** Cost Effectiveness Tests / Equitable Energy Efficiency Baseline
Union Electric Company d/b/a Ameren Missouri	OPC	EA-2018-0202	**Rebuttal:** Renewable Energy Standard Rate Adjustment Mechanism/Conservation **Surrebuttal:** Endangered and Protected Species
Kansas City Power & Light & KCP&L Greater Missouri Operations Company	OPC	ER-2018-0145 ER-2018-0146	**Direct:** Smart Grid Data Privacy Protections **Rebuttal:** Clean Charge Network / Community Solar / Low Income Community Solar / PAYS/ Weatherization/Economic Relief Pilot Program/Economic Development Rider/Customer Information System and Billing

			Rebuttal: TOU Rates / IBR Rates / Customer Charge / Restoration Charge **Surrebuttal:** KCPL-GMO Consolidation / Demand Response / Clean Charge Network / One CIS: Privacy, TOU Rates, Billing & Customer Experience
Union Electric Company d/b/a Ameren Missouri	OPC	ET-2018-0063	**Rebuttal:** Green Tariff
Liberty Utilities	OPC	GR-2018-0013	**Surrebuttal:** Decoupling
Empire District Electric Company	OPC	EO-2018-0092	**Rebuttal:** Overview of proposal/ MO PSC regulatory activity / Federal Regulatory Activity / SPP Activity and Modeling / Ancillary Considerations **Surrebuttal** Response to parties **Affidavit** in opposition to the non-unanimous stipulation and agreement
Great Plains Energy Incorporated, Kansas City Power & Light Company, KCP&L Greater Missouri Operations Company, and Westar Energy, Inc.	OPC	EM-2018-0012	**Rebuttal:** Merger Commitments and Conditions / Outstanding Concerns
Missouri American Water	OPC	WR-2017-0285	**Direct:** Future Test Year/ Cost Allocation Manual and Affiliate Transaction Rules for Large Water Utilities / Lead Line Replacement **Direct:** Rate Design / Cost Allocation of Lead Line Replacement **Rebuttal:** Lead Line Replacement / Future Test Year/ Decoupling / Residential Usage / Public-Private Coordination **Rebuttal:** Rate Design **Surrebuttal:** Affiliate Transaction Rules / Decoupling / Inclining Block Rates / Future Test Year / Single Tariff Pricing / Lead Line Replacement
Missouri Gas Energy / Laclede Gas Company	OPC	GR-2017-0216 GR-2017-0215	**Rebuttal:** Decoupling / Rate Design / Customer Confidentiality / Line Extension in Unserved and Underserved Areas / Economic Development Rider & Special Contracts **Surrebuttal:** Pay for Performance / Alagasco & EnergySouth Savings / Decoupling / Rate Design / Energy Efficiency / Economic Development Rider: Combined Heat & Power
Indian Hills Utility	OPC	WR-2017-0259	**Direct:** Rate Design

Rule Making	OPC	EW-2018-0078	**Memorandum:** Cogeneration and net metering - Disclaimer Language regarding rooftop solar
Empire District Electric Company	OPC	EO-2018-0048	**Memorandum:** Integrated Resource Planning: Special Contemporary Topics Comments
Kansas City Power & Light	OPC	EO-2018-0046	**Memorandum:** Integrated Resource Planning: Special Contemporary Topics Comments
KCP&L Greater Missouri Operations Company	OPC	EO-2018-0045	**Memorandum:** Integrated Resource Planning: Special Contemporary Topics Comments
Missouri American Water	OPC	WU-2017-0296	**Direct:** Lead line replacement pilot program **Rebuttal:** Lead line replacement pilot program **Surrebuttal:** Lead line replacement pilot program
KCP&L Greater Missouri Operations Company	OPC	EO-2017-0230	**Memorandum** on Integrated Resource Plan, preferred plan update
Working Case: Emerging Issues in Utility Regulation	OPC	EW-2017-0245	**Memorandum** on Emerging Issues in Utility Regulation / **Presentation:** Inclining Block Rate Design Considerations **Presentation:** Missouri Integrated Resource Planning: And the search for the "preferred plan." **Memorandum:** Draft Rule 4 CSR 240-22.055 DER Resource Planning
Rule Making	OPC	EX-2016-0334	**Memorandum** on Missouri Energy Efficiency Investment Act Rule Revisions
Great Plains Energy Incorporated, Kansas City Power & Light Company, KCP&L Greater Missouri Operations Company, and Westar Energy, Inc.	OPC	EE-2017-0113 / EM-2017-0226	**Direct:** Employment within Missouri / Independent Third Party Management Audits / Corporate Social Responsibility
Union Electric Company d/b/a Ameren Missouri	OPC	ET-2016-0246	**Rebuttal:** EV Charging Station Policy **Surrebuttal:** EV Charging Station Policy
Kansas City Power & Light		ER-2016-0285	**Direct:** Consumer Disclaimer **Direct:** Response to Commission Directed Questions **Rebuttal:** Customer Experience / Greenwood Solar Facility / Dues and Donations / Electric Vehicle Charging Stations **Rebuttal:** Class Cost of Service / Rate Design

			Surrebuttal: Clean Charge Network / Economic Relief Pilot Program / EEI Dues / EPRI Dues
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2016-0179	**Direct:** Consumer Disclaimer / Transparent Billing Practices / MEEIA Low-Income Exemption **Direct:** Rate Design **Rebuttal:** Low-Income Programs / Advertising / EEI Dues **Rebuttal:** Grid-Access Charge / Inclining Block Rates /Economic Development Riders
KCP&L Greater Missouri Operations Company	OPC	ER-2016-0156	**Direct:** Consumer Disclaimer **Rebuttal:** Regulatory Policy / Customer Experience / Historical & Projected Customer Usage / Rate Design / Low-Income Programs **Surrebuttal:** Rate Design / MEEIA Annualization / Customer Disclaimer / Greenwood Solar Facility / RESRAM / Low-Income Programs
Empire District Electric Company, Empire District Gas Company, Liberty Utilities (Central) Company, Liberty Sub-Corp.	OPC	EM-2016-0213	**Rebuttal:** Response to Merger Impact **Surrebuttal:** Resource Portfolio / Transition Plan
Working Case: Polices to Improve Electric Regulation	OPC	EW-2016-0313	**Memorandum** on Performance-Based and Formula Rate Design
Working Case: Electric Vehicle Charging Facilities	OPC	EW-2016-0123	**Memorandum** on Policy Considerations of EV stations in rate base
Empire District Electric Company	OPC	ER-2016-0023	**Rebuttal:** Rate Design, Demand-Side Management, Low-Income Weatherization **Surrebuttal:** Demand-Side Management, Low-Income Weatherization, Monthly Bill Average
Missouri American Water	OPC	WR-2015-0301	**Direct:** Consolidated Tariff Pricing / Rate Design Study **Rebuttal:** District Consolidation/Rate Design/Residential Usage/Decoupling **Rebuttal:** Demand-Side Management (DSM)/ Supply-Side Management (SSM) **Surrebuttal:** District Consolidation/Decoupling

			Mechanism/Residential Usage/SSM/DSM/Special Contracts
Working Case: Decoupling Mechanism	OPC	AW-2015-0282	**Memorandum:** Response to Comments
Rule Making	OPC	EW-2015-0105	Missouri Energy Efficiency Investment Act Rule Revisions, Comments
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2015-0084	Triennial Integrated Resource Planning Comments
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2015-0055	**Rebuttal:** Demand-Side Investment Mechanism / MEEIA Cycle II Application **Surrebuttal:** Potential Study / Overearnings / Program Design **Supplemental Direct:** Third-party mediator (Delphi Panel) / Performance Incentive **Supplemental Rebuttal:** Select Differences between Stipulations **Rebuttal:** Pre-Pay Billing
The Empire District Electric Company	OPC	EO-2015-0042	Integrated Resource Planning: Special Contemporary Topics Comments
KCP&L Greater Missouri Operations Company	OPC	EO-2015-0041	Integrated Resource Planning: Special Contemporary Topics Comments
Kansas City Power & Light	OPC	EO-2015-0040	Integrated Resource Planning: Special Contemporary Topics Comments
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2015-0039	Integrated Resource Planning: Special Contemporary Topics Comments
Kansas City Power & Light	OPC	ER-2014-0370	**Direct** (Revenue Requirement): Solar Rebates **Rebuttal:** Rate Design / Low-Income Weatherization / Solar Rebates **Surrebuttal:** Economic Considerations / Rate Design / Cyber Security Tracker
Rule Making	OPC	EX-2014-0352	**Memorandum** Net Metering and Renewable Energy Standard Rule Revisions,
The Empire District Electric Company	OPC	ER-2014-0351	**Rebuttal:** Rate Design/Energy Efficiency and Low-Income Considerations
Rule Making	OPC	AW-2014-0329	Utility Pay Stations and Loan Companies, Rule Drafting, Comments
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2014-0258	**Direct:** Rate Design/Cost of Service Study/Economic Development Rider **Rebuttal:** Rate Design/ Cost of Service/ Low Income Considerations **Surrebuttal:** Rate Design/ Cost-of-Service/ Economic Development Rider
KCP&L Greater Missouri Operations Company	OPC	EO-2014-0189	**Rebuttal:** Sufficiency of Filing **Surrebuttal:** Sufficiency of Filing

KCP&L Greater Missouri Operations Company	OPC	EO-2014-0151	Renewable Energy Standard Rate Adjustment Mechanism (RESRAM) Comments
Liberty Natural Gas	OPC	GR-2014-0152	**Surrebuttal:** Energy Efficiency
Summit Natural Gas	OPC	GR-2014-0086	**Rebuttal:** Energy Efficiency **Surrebuttal:** Energy Efficiency
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2012-0142	**Direct:** PY2013 EM&V results / Rebound Effect **Rebuttal:** PY2013 EM&V results **Surrebuttal:** PY2013 EM&V results **Direct:** Cycle I Performance Incentive **Rebuttal:** Cycle I Performance Incentive
Kansas City Power & Light	Missouri Public Service Commission Staff	EO-2014-0095	**Rebuttal:** MEEIA Cycle I Application testimony adopted
KCP&L Greater Missouri Operations Company	Missouri Division of Energy (DE)	EO-2014-0065	Integrated Resource Planning: Special Contemporary Topics Comments
Kansas City Power & Light	DE	EO-2014-0064	Integrated Resource Planning: Special Contemporary Topics Comments
The Empire District Electric Company	DE	EO-2014-0063	Integrated Resource Planning: Special Contemporary Topics Comments
Union Electric Company d/b/a Ameren Missouri	DE	EO-2014-0062	Integrated Resource Planning: Special Contemporary Topics Comments
The Empire District Electric Company	DE	EO-2013-0547	Triennial Integrated Resource Planning Comments
Working Case: State-Wide Advisory Collaborative	OPC	EW-2013-0519	**Presentation:** Does Better Information Lead to Better Choices? Evidence from Energy-Efficiency Labels **Presentation:** Customer Education & Demand-Side Management **Presentation:** MEEIA: Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis
Independence-Missouri	OPC	Indy Energy Forum 2014	**Presentation:** Energy Efficiency
Independence-Missouri	OPC	Indy Energy Forum2015	**Presentation:** Rate Design
NARUC – 2017 Winter, Washington D.C.	OPC	Committee on Consumer Affairs	**Presentation:** PAYS Tariff On-Bill Financing
NASUCA – 2017 Mid-Year, Denver	OPC	Committee on Water Regulation	**Presentation:** Regulatory Issues Related to Lead-Line Replacement of Water Systems
NASUCA – 2017 Annual Baltimore,	OPC	Committee on Utility Accounting	**Presentation:** Lead Line Replacement Accounting and Cost Allocation
NARUC – 2018 Annual, Orlando	OPC	Committee on Consumer Affairs	**Presentation:** PAYS Tariff On-Bill Financing Opportunities & Challenges

Critical Consumer Issues Forum (CCIF)—New Orleans	OPC	Examining Polices for Delivering Smart Mobility	**Presentation:** Missouri EV Charging Station Policy in 4 Acts: Missouri Office of the Public Counsel Perspective
Michigan State, Institute of Public Utilities, 2019	OPC	Camp NARUC: Fundamentals	**Presentation:** Revenue Requirement
NARUC/US AID, Republic of North Macedonia, Skopje 2019	OPC	NARUC /US AID: Cybersecurity	**Presentation:** Case Study: The Missouri Experience, Cybersecurity and Data Privacy
Kansas, Clean Energy Business Council ("CEBC"), 2020	OPC	Climate and Energy Project	**Presentation:** Energy Efficiency and Pay as You Save (PAYS)
Michigan State, Institute of Public Utilities, 2020	OPC	Camp NARUC: Fundamentals	**Presentation:** Fundamentals of Economic Regulation / Performance Base Regulation
Renew Missouri	OPC	MoBar Continued Learning Education Credit	**Presentation:** Regulatory Incentives and Utility Performance
Missouri Bar Association	OPC	MoBar Fall Environmental & Energy Law Committee	**Presentation:** The Virus, The Economy and Regulated Utility Service: An Overview of Utilities and Stakeholders Response to COVID-19 and the Recession to Date
University of Missouri and City of Columbia, MO., 2021	OPC	Advancing Renewables in the Midwest	**Presentation:** The Heat Is On: Demand Side Management of Urban Heat Islands
NARUC/US AID, Indonesia, Jakarta 2021	OPC	Indonesia Ministry of Energy and Mineral Resources (MEMR)	**Presentation**: Introduction to Tariff Setting & Review: Utility Revenue Requirement, Cost Allocation & Rate Design
Michigan State, Institute of Public Utilities, 2021	OPC	Camp NARUC: Fundamentals	**Presentation:** Fundamentals of Economic Regulation

2021 Spring Post-Construction Bat Mortality Monitoring Report

High Prairie Renewable Energy Center

Schuyler and Adair Counties, Missouri

Technical Assistance Letter (TAL) Level Monitoring

Project #193708256

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

1.0 Introduction

1.1 PROJECT DESCRIPTION AND HISTORY

The High Prairie Renewable Energy Center (Project or High Prairie) is operated by Ameren Missouri (Ameren), and consists of 175 turbines with an approximate 400-megawatt (MW) operating capacity in Schuyler and Adair counties, Missouri.

Due to the potential risk of take of the federally-endangered Indiana bat (*Myotis sodalis*) and federally-threatened northern long-eared bat (*Myotis septentrionalis*) during operations, Ameren applied for an Incidental Take Permit (ITP) for these species, as well as for the little brown bat (*Myotis lucifugus*). In the interim, the Project operated under a Technical Assistance Letter (TAL) from the U.S. Fish and Wildlife Service (USFWS).

To avoid potential effects to the Indiana bat and northern long-eared bat, the TAL required feathering of all turbines below 6.9 meters-per-second (m/s) for 0.5 hour before sunset to 0.5 hour after sunrise when air temperatures were above 50°F from March 15 through October 31 based on the 10-minute rolling average at each individual turbine. Due to the fatality of a male Indiana bat at the Project in September 2020, Ameren voluntarily increased the avoidance measures to involve no operation of the turbines when temperatures were above 50°F starting on March 15, 2021. Another fatality was discovered on April 15, 2021; Ameren voluntarily stopped all night time operations starting on April 19, 2021, but continued post-construction monitoring under the TAL until the ITP was issued on May 14, 2021.

The post-construction monitoring followed the protocols outlined in the TAL. This included a weekly search interval at 100% of Project turbines. At 10% of turbines, a 60-meter (m) full plot was searched, while at the remaining turbines the roads and pads were searched out to 95-m.

1.2 PURPOSE AND OBJECTIVES OF THE MONITORING

Post-construction mortality monitoring activities adhered to the post-construction monitoring requirements outlined in the Project's TAL, specifically to document overall bat fatality rates and confirm avoidance of Indiana bat and northern long-eared bat fatalities.

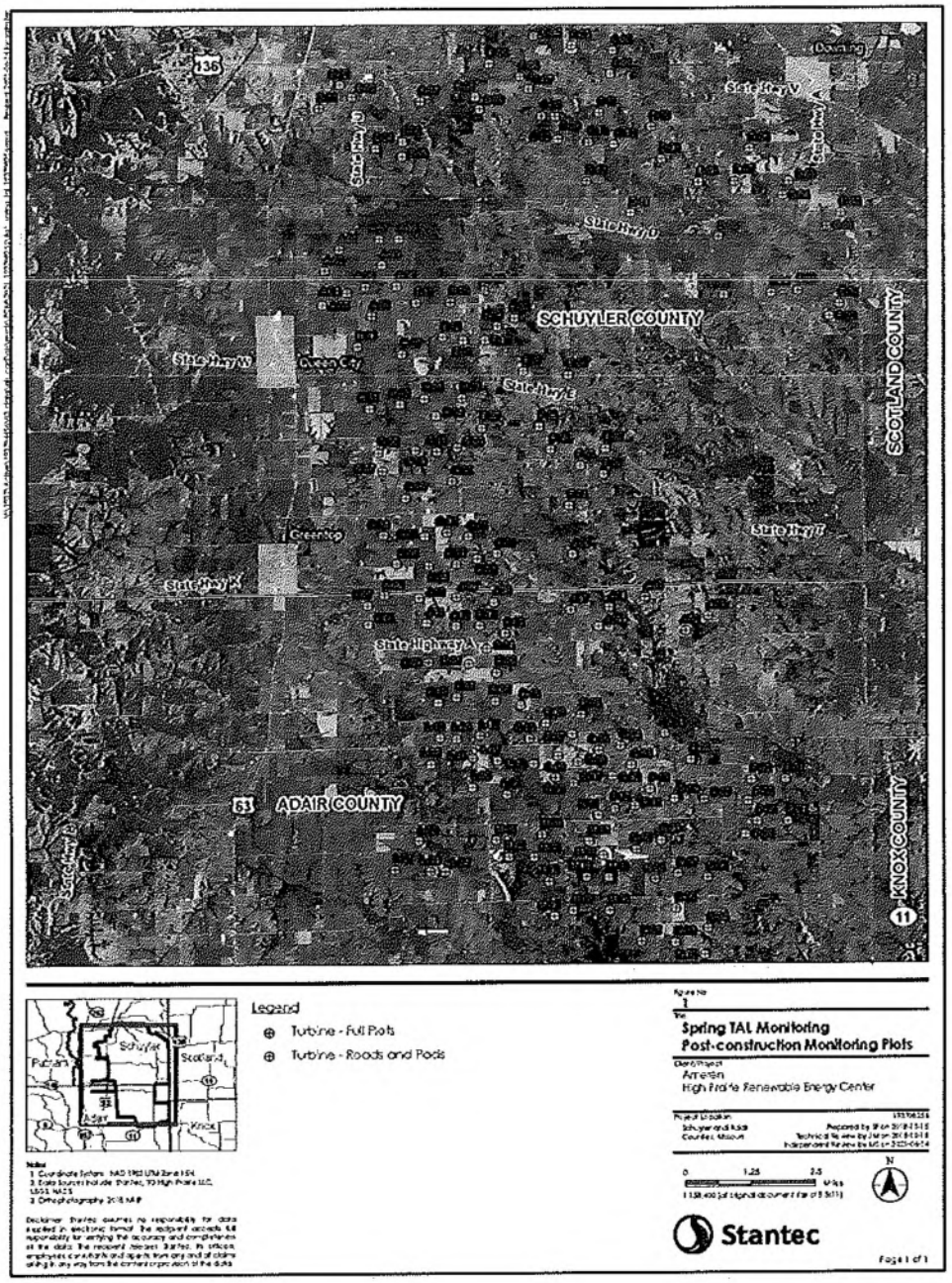


Figure 1. Project Location and Turbine Locations

2.0 Methods

Post-construction monitoring included the following components:

1. Standardized carcass searches to systematically search plots at all turbines for bat and bird casualties attributable to the turbines
2. Searcher efficiency trials to estimate the percentage of bat casualties that were found by the searcher(s)
3. Carcass removal trials to estimate the persistence time of carcasses on-site before scavengers removed them

2.1 FIELD METHODS

Standardized carcass searches were conducted from March 15 – May 14, 2021.

2.1.1 Sample Size

Post-construction monitoring was conducted at 100% of the turbines. This study design provides full coverage of the facility and will serve as a control to which subsequent monitoring results can be compared.

2.1.2 Search Plot Size

Searches consisted of searching pads and roads out to 328 feet (ft; 100 meters [m]) at 90% of the turbines (n=158) and full plots out to 197 ft (60 m) at 10% of the turbines (n=17).

2.1.3 Search Schedule

All turbines were searched once weekly per the TAL.

2.1.4 Standardized Carcass Searches

Standardized carcass searches were conducted by searchers experienced and/or trained in fatality search methods, including proper handling and reporting of carcasses. Searchers were familiar with and able to accurately identify bat and bird species likely to be found in the project area. Photos of any unknown bats discovered were sent to a Stantec permitted bat biologist for positive identification, and carcasses were kept on-site. During searches, searchers walked at a rate of approximately 2 miles per hour (mph; 45 to 60 m per minute) while searching 10 ft (3 m) on either side.

For each carcass found, the following data were recorded:

- Date and time
- Initial species identification
- Sex, age, and reproductive condition (when possible)

- Global positioning system (GPS) location
- Distance and bearing to turbine
- Condition (intact, scavenged, decomposed)
- Any notes on presumed cause of death

A digital photograph of each carcass found was taken before the carcass was handled and removed. All bat carcasses were labeled with a unique number, bagged, and stored in a freezer at the Project Operations and Maintenance Building[1]. Bat carcasses were collected and retained under Missouri Department of Conservation Wildlife Collector's Permits #19170 and #19158.

Bat carcasses found in non-search areas and any bird carcasses found were coded as incidental finds and documented in a similar fashion to those found in standardized surveys when possible. These included carcasses found during non-search times and decomposed carcasses found during the first week of searches that, based on the level of decomposition, had died prior to the post-construction monitoring period. Bird carcasses were photographed and documented, but they were not collected and were left as found. Incidental bat carcasses were collected and stored in the freezer with the carcasses found during standardized surveys. Incidental finds were not included in the mortality estimates.

2.1.5 Species Identification

Preliminary bat and bird species identifications were made in the field by qualified staff. When carcass condition allowed, sex and age of the carcass were recorded. For bat carcasses, forearm length was recorded to facilitate species identification. Any unknown bat was identified by a Stantec permitted bat biologist. In addition to the carcass, photographs and data collected for each carcass were used to verify the species identification.

2.1.6 Searcher Efficiency Trials

Searcher efficiency trials were used to estimate the probability of bat carcass detection by the searchers. The searchers did not know when during the monitoring periods the trials were being conducted, at which turbines trial carcasses were placed, or the location or number of trial carcasses placed in any given search plot. Commercially-available brown mouse carcasses were used as trial carcasses to represent bats.

All searcher efficiency trial carcasses were randomly placed by the field lead within the search plots. These were placed either the evening before monitoring, or in the morning prior to the planned carcass surveys for that day. The number of trial carcasses found by the searcher during the mortality surveys in each plot was recorded and compared to the total number of trial carcasses placed in the plot and not scavenged prior to the mortality search.

[1] The first bat found of the season, on 16 March, was not collected, as a salvage permit from the state had not yet been received. The Indiana bat found on 15 April was sent to the Wildlife Health Lab in Madison, Wisconsin per the USFWS for necropsy and genetic testing. All other bat carcasses are in the O&M building freezer.

2.1.7 Carcass Removal Trials

Following the searcher efficiency trials, a carcass removal trial was conducted to estimate the average length of time carcasses remained in the search plots (i.e., were available to find) before being removed by scavengers. . Mouse carcasses used during the searcher efficiency trials were left in place, and their locations were discretely marked. Searchers monitored the trial carcasses over a period of up to 30 days. During the carcass removal trial, carcasses were checked every day for the first week, and then on days 10, 14, 20, and 30.

The condition of each carcass was recorded during each trial check. The conditions recorded were defined as follows:

- Intact – complete carcass with no body parts missing
- Scavenged – carcass with some evidence or signs of scavenging
- Fur spot – no carcass, but fur spot remaining
- Missing – no carcass or fur remaining

Any carcasses remaining at the end of the 30-day trial period were removed from the field.

2.2 DATA ANALYSIS

The Generalized Estimator (GenEst; Dalthorp et al. 2018) was used for calculating bias correction factors (searcher efficiency, carcass persistence, and area adjustment) and the overall mortality rate and fatality estimates for all bats at the Project.

2.2.1 Searcher Efficiency (p)

Searcher efficiency (p) represents the average probability that a carcass was detected by the surveyor. The searcher efficiency rate was calculated using the data collected during searcher efficiency trials (Section 2.1.6) by dividing the number of trial carcasses the observer found by the total number which remained available during the trial (i.e., non-scavenged). Analysis includes an evaluation of whether searcher efficiency differed by searcher or plot type (roads and pads vs full plots). GenEst returns numerous models depending on the number of variables included in the analysis, as well as Akaike information criterion (AIC) values for each model. The best model was chosen based on a comparison of models with the lowest AIC values, though models are also graphically evaluated to ensure that they are logical.

We assumed that searcher efficiency decay (k) was fixed at 0.67. This value represents the decrease in searcher efficiency (p) on subsequent searches (i.e., if a carcass is missed the first time it is available, it is less likely to be found on subsequent searches than a "fresh" carcass).

2.2.2 Carcass Persistence

Carcass persistence times modeled in GenEst include using censored exponential, Weibull, lognormal, and loglogistic survival models of the data collected as part of the carcass removal

trial (Section 2.1.3). GenEst returns numerous models depending on the number of variables included in the analysis, as well as AIC values for each model. The best model was chosen based on a comparison of models with the lowest AIC values, though models are also graphically evaluated to ensure that they are logical.

2.2.3 Density-weighted Proportion (DWP)

The density-weighted proportion (DWP) was calculated based on publicly available data on carcass distribution and known information about the plots and roads and pads at High Prairie, since only four carcasses were found during monitoring, and a site-specific density-weighted-proportion could not be calculated.

Specifically, based on data provided by USFWS for turbines operating uncurtailed, it is assumed that 100% of carcasses fall within 322 ft (98 m) of a turbine (Table 2-1, USFWS, personal communication). For the 60-m full plots, this means that 80% of carcasses are falling within the plots. For the roads and pads, we calculated what percent of each distance band was being searched, and were then able to calculate what percent of carcasses were falling within searched areas (by multiplying the percent of carcasses within a band by the percent of that band being searched). The sum of these values is 4.0%, which would indicate that 4.0% of the fatalities at the project will fall within the road and pad search plots.

Table 2-1. Summary of USFWS data on carcass distribution, and calculation of area adjustment for roads and pads.

Distance from turbine	Percent of Carcasses (USFWS, personal communication)	% of area included in standardized searches	% of carcasses falling within searched areas on roads and pads
0-10 meters	6%	24.7%	1.5%
10 – 20 meters	10%	4.7%	0.5%
20 – 30 meters	15%	3.7%	0.6%
30 – 40 meters	20%	3.0%	0.6%
40 – 50 meters	16%	2.2%	0.4%
50 – 60 meters	13%	1.8%	0.2%
60 – 70 meters	10%	1.6%	0.2%
70 – 80 meters	5%	1.3%	0.1%
80 – 90 meters	3%	1.2%	0.0%

Distance from turbine	Percent of Carcasses (USFWS, personal communication)	% of area included in standardized searches	% of carcasses falling within searched areas on roads and pads
90 – 98 meters	2%	1.1%	0.0%
TOTAL	100%	n/a	4.0%

The proportion of the area that was searched (i.e., within the road and pad) within each of these distance bands was determined via GIS analysis. Each turbine was then assigned a DWP based on whether a full plot or road and pad search was conducted at that turbine.

The DWP analysis provided a turbine-specific adjustment for the total number of bat carcasses that would have been found within 100-m of the turbine, had the entire plots been searched.

2.2.4 Detection Probability (g)

The detection probability (g) is the probability that a carcass is found if it arrives within a searched area. This value is not used within GenEst to calculate mortality (which uses a sophisticated, carcass-specific detection probability). Nonetheless, rough summaries of detection probabilities are provided for planning purposes. These values are calculated based on the searcher efficiency, carcass persistence, and search schedule.

2.2.5 Adjusted Mortality Estimates (GenEst)

GenEst was used to calculate overall mortality rates for the Project (per turbine, per MW, and for all 175 turbines). All estimates include 90% confidence intervals. Per turbine estimates were calculated by dividing the GenEst estimate (and confidence intervals) by the number of turbines (175 turbines), and per MW estimates were calculated by dividing the GenEst estimate (and confidence intervals) by the total MW (400 MW).

2.2.6 Design Protocols – Future Monitoring

To determine the probability of detection (g) of future monitoring (i.e., summer monitoring under the Habitat Conservation Plan [HCP]), the "Single Class Module" in Evidence of Absence (Dalthorp et al. 2017) was used. This analysis included utilizing the bias correction factors calculated in GenEst (e.g., searcher efficiency, carcass persistence) and the proposed protocols to determine whether the detection probability (g) of the summer monitoring would achieve the desired detection probability (g) of at least 0.2 (per the Project's HCP).

3.0 Results

3.1 BATS

3.1.1 Standardized Carcass Searches

A total of 152 full plot searches and 1,412 road and pad searches were conducted over 9 weeks (15 March–14 May), in the post-construction monitoring period.

A total of three (3) individual bat carcasses were found during standardized carcass searches, and one (1) bat was found incidentally.

3.1.1.1 Species Composition

A summary of all bat carcasses found during the standardized carcass searches and incidentally during post-construction monitoring is shown in Table 3-1.

A total of four bat carcasses were found, three of which were identified to the species level, including one eastern red bat (*Lasiurus borealis*), one silver-haired bat (*Lasionycteris noctivagans*; species of conservation concern in Missouri) and one Indiana bat. The fourth bat was determined to be either a hoary bat (*Lasiurus cinereus;* species of conservation concern in Missouri) or big brown bat (*Eptesicus fuscus*) based on forearm length. Based on the condition of this bat when found on 16 March 2021, it is assumed this bat died prior to winter, and is thus considered an incidental find.

The Indiana bat is federally listed as endangered under the Endangered Species Act of 1973 (ESA), as amended. No other federally-listed bat species were found during the spring TAL monitoring. The Indiana bat is also state-listed as endangered, and was the only state-listed bat species found as well. USFWS and MDC were notified of this fatality via phone within 24 hours, with follow-up email correspondence (Appendix A), and the Project voluntarily suspended night operations regardless of temperature (down to -20°F) to avoid any additional unpermitted take. A necropsy from this bat is provided in Appendix B.

Table 3-1. Summary of all bat carcasses found incidentally and during standardized carcass searches during spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Species	Total (percent of total)
Eastern Red Bat	1 (25%)
Silver-haired Bat	1 (25%)
Indiana Bat	1 (25%)
Unknown (Big Brown bat or Hoary Bat)	1 (25%)
Total	**4**

3.1.2 Searcher Efficiency

Three searcher efficiency trials were conducted during the carcass searches, and a total of 37 mouse carcasses were placed for the searcher efficiency trials.

GenEst models indicated that searcher efficiency was best modeled using a constant searcher efficiency and did not vary by searcher or plot type. Searcher efficiency was estimated at 94.6% (90% CI: 84.1% - 98.3%).

Table 3-2. Searcher efficiency during spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Parameter	Value
Number of Carcasses Placed	37
Number of Carcasses Found	35
(p) Searcher Efficiency Mean (90% CI)	**0.946 (0.841 – 0.983)**

3.1.3 Carcass Persistence

Twenty-six of the mouse carcasses used in the searcher efficiency trials were left in place and monitored for up to 42 days. Carcasses were checked daily for the first 8 days, and then checked during the regular weekly search.

GenEst models indicated that carcass persistence was best modeled using a Weibull distribution with the location parameter varying by plot type (road and pad versus full plots) and a constant scale parameter. Carcass persistence averaged 9.3 days on full plots (90% CI: 6.0 to 14.1 days) and 5.3 days on roads and pads (90% CI: 3.6 to 7.6 days).

Table 3-3. Carcass persistence during spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Parameter	Full Plots	Roads and Pads
Number of Carcasses Placed	12	14
Number of Carcasses Scavenged within 7 days	7	5
Mean Carcass Persistence time in days (90% CI)	**9.3** (6.0, 14.1)	**5.3** (3.6, 7.6)

3.1.4 Detection Probability (g)

The detection probability within searched areas was estimated to be 77.6% for full plots and 63.4% for roads and pads (Table 3-4).

Table 3-4. Detection probability (g) during spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Parameter	Full plots	Roads and Pads
(p) Mean Searcher Efficiency	**0.946**	**0.946**
(t) Mean Carcass Persistence time in days	**9.3**	**5.3**

Parameter	Full plots	Roads and Pads
Search Interval (in days)	7	7
(g) Mean Detection Probability	77.6%	63.4%

3.1.5 Adjusted Mortality Estimates

Mortality rate estimates were calculated based upon the carcasses found during the standardized carcass searches and did not include any incidental finds. Observed bat mortality estimates were adjusted to account for searcher efficiency, carcass removal, and an area adjustment using the methods described in Section 2.2.

Over the entire spring migratory period (15 March–14 May), the estimated bat mortality (90% CI) was between 0.02 to 0.69 bat per turbine, with a mean of 0.24 bat per turbine, or approximately 43 bats across the entire facility during the search period (Table 3-5).

Table 3-5. Bat mortality estimates from GenEst for the spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Parameter	Estimate
(c) Observed bats/turbine	**0.02**
(m) Estimated bats/facility (90% CI)	**42.6** (3.0, 120.5)
Estimated bats/turbine (90% CI)	**0.24** (0.02, 0.69)
Estimated bats/MW (90% CI)	**0.11** (0.01, 0.30)

3.2 BIRDS

A total of 52 bird carcasses representing 20 species were found during the 2021 spring TAL post-construction monitoring (Table 3-6). The most common species found (n>1) were the red-tailed hawk (*Buteo jamaicensis*; n=10), European starling (*Sturnus vulgaris*; n=7), turkey vulture (*Cathartes aura*; n=6), golden-crowned kinglet (*Regulus satrapa*; n=3), rough legged hawk (*Buteo lagopus*; n=3), horned lark (*Eremophila alpestris*; n=3), ruby-crowned kinglet (*Regulus calendula*; n=2), and killdeer (*Charadrius vociferus*; n=2). Four carcasses could not be identified to the species level.

Table 3-6. Summary of bird carcasses found during the spring 2021 TAL post-construction monitoring at the High Prairie Renewable Energy Center, Schuyler and Adair counties, Missouri.

Date	Species	Turbine
3/15/2021	Red-tailed Hawk (*Buteo jamaicensis*)	B-02
3/15/2021	Rough legged Hawk (*Buteo lagopus*)	A-10
3/16/2021	Red-tailed Hawk	H-03
3/19/2021	European Starling (*Sturnus vulgaris*)	C-13
3/22/2021	European Starling	L-10
3/22/2021	Green-winged Teal (*Anas carolinensis*)	L-08
3/22/2021	Golden Crowned Kinglet (*Regulus satrapa*)	R-08
3/22/2021	Red-tailed Hawk	L-10
3/22/2021	Rough legged Hawk	Q-09
3/22/2021	Red-tailed Hawk	Q-07
3/24/2021	European Starling	N-03
3/25/2021	European Starling	A-07
3/25/2021	Red-tailed Hawk	B-04
3/26/2021	Killdeer (*Charadrius vociferus*)	D-04
3/30/2021	Downy Woodpecker (*Picoides pubescens*)	P-04
3/31/2021	Rough legged Hawk	K-03
4/1/2021	Killdeer	H-04
4/2/2021	Ring-necked Pheasant (*Phasianus colchicus*)	R-08
4/12/2021	Mourning dove (*Zenaida macroura*)	A-04
4/14/2021	Turkey vulture (*Cathartes aura*)	R-08
4/15/2021	Horned Lark (*Eremophila alpestris*)	P-03
4/15/2021	Turkey Vulture	P-11
4/16/2021	European Starling	M-05
4/19/2021	Yellow-rumped Warbler (*Setophaga coronata*)	P-06
4/19/2021	Unknown passerine	P-11
4/19/2021	Dark-eyed Junco (*Junco hyemalis*)	M-12
4/21/2021	European Starling	N-06
4/21/2021	Red-tailed Hawk	Q-03
4/22/2021	Golden-crowned Kinglet	J-10
4/22/2021	Ruby-crowned Kinglet (*Regulus calendula*)	J-10
4/22/2021	Golden-crowned Kinglet	J-10
4/26/2021	Turkey vulture	J-02
4/27/2021	European Starling	N-03
4/27/2021	Blue-gray Gnatcatcher (*Polioptila caerulea*)	K-11
4/27/2021	Red-tailed Hawk	P-04

Date	Species	Turbine
4/30/2021	Yellow-throated Vireo (*Vireo flavifrons*)	E-05
5/3/2021	Unknown flycatcher	B-05
5/3/2021	Bald Eagle (*Haliaeetus leucocephalus*)	H-06
5/4/2021	Turkey vulture	D-01
5/5/2021	Red-tailed Hawk	R-02
5/6/2021	Ruby-crowned kinglet	L-01
5/6/2021	Horned lark	N-08
5/6/2021	Tree Swallow (*Tachycineta bicolor*)	F-07
5/6/2021	Turkey vulture	L-11
5/11/2021	Unknown (suspected duck spp.)	J-06
5/11/2021	Virginia Rail (*Rallus limicola*)	F-03
5/11/2021	Red-tailed Hawk	G-01
5/12/2021	Unknown passerine	A-04
5/13/2021	Horned Lark	L-05
5/13/2021	Turkey Vulture	P-10
5/13/2021	Red-tailed Hawk	J-07
5/14/2021	Palm warbler (*Setophaga palmarum*)	Q-06

Of the 52 birds found, one federally-protected bald eagle (*Haliaeetus leucocephalus*) was found. Ameren notified the USFWS and MDC of the bald eagle fatality, and had previously applied for an eagle take permit under the Bald and Golden Eagle Protection Act (BGEPA) in August 2020. The Project continues to work with the USFWS to obtain an eagle take permit. The bald eagle and one additional species, the Virginia rail (*Rallus limicola*), are also species of conservation concern in Missouri, and MDC was notified of these fatalities (Appendix A).

3.3 DESIGN PROTOCOLS – FUTURE MONITORING

Due to the issuance of the Incidental Take Permit on May 14, 2021, the Project will be conducting HCP-level monitoring during the summer bat season (May 15 – August 15), which includes twice weekly searches at 40% full plots and 60% roads and pads. This was designed to achieve a detection probability (g) of at least 0.2, but will be evaluated seasonally based on the site-specific bias correction factors, and altered as needed to achieve at least the desired detection probability.

Inputs into the "Single Class Module" in EofA included the following (see Appendix C for screenshots):

- Searcher efficiency: 37 trial carcasses placed, of which 35 were found; k=067

- Carcass persistence: Weibull distribution with shape=1.171 and scale=9.128 (this was modeled using the actual carcass persistence data collected, through EofA)
- Area adjustment of 0.344[2]
- Search interval of 3.5 days (twice weekly) for 26 searches

This results in an estimated detection probability (g) of 0.287 (95% CI: 0.253 – 0.321), which is above the goal of 0.2. Therefore, no changes to the proposed protocols are proposed at this time. Additional carcass persistence and searcher efficiency trials will be conducted during summer monitoring.

4.0 Summary and Conclusion

- A total of 152 full plot searches and 1,412 road and pad searches were conducted over 9 weeks between 15 March and 14 May 2021.
- A total of 4 bat carcasses and 52 bird carcasses were found during post-construction monitoring. One of the four bat carcasses was incidental (determined to have died prior to the start of the spring monitoring period), and was not included in mortality estimation.
- One federally-listed bat species, the Indiana bat, was found during the monitoring period on 15 April 2021 when operating under what had previously been considered avoidance protocols. A necropsy of this bat determined that the bat was positive for white nose syndrome (WNS), and tentatively attributed the death to that disease. Please see Appendix B for additional details of the necropsy results and Appendix A for e-mail correspondence.
- One federally-protected bald eagle was found during the monitoring period on 3 May 2021. Please see Appendix A for e-mail correspondence.
- The estimated mean bat fatality rate during the spring monitoring period (15 March – 14 May) was calculated at 0.24 bat/turbine (90% CI: 0.02, 0.69) or 0.11 bat/MW (90% CI: 0.01, 0.30), resulting in a facility-wide bat mortality of 42.6 bats (90% CI: 3.0, 120.5) during the monitoring period. This monitoring period included approximately five weeks of curtailing at night when temperatures were above 50°F (March 15 – April 18), and four weeks of no operation at night regardless of temperature (April 19 - May 14).

[2] 4.0% of carcasses fall within the road and pad, and 80% fall within full plots; using 40% full plots and 60% roads and pads

5.0 Literature Cited

Dalthorp, D., M. Huso, and D. Dail. 2017. Evidence of Absence (v2.0) Software User Guide: U.S. Geological Survey Data Series 1055, 109 p.. https://doi.org/10.3133/ds1055.

Dalthorp, D., L. Madsen, M.M. Huso, P.A. Rabie, R. Wolpert, J. Studyvin, J. Simonis, and J. Mintz. 2018. GenEst statistical models – A generalized estimator of mortality. No. 7-A2. U.S. Geological Survey, 2018.

APPENDIX A

Correspondence with USFWS and MDC

From:	Stephenson, Molly
To:	Jordan Meyer
Cc:	Epplin, Julianne; Atkins, Kevin D; Terry VanDeWalle (Terry.Vandewalle@stantec.com)
Subject:	Indiana Bat - High Prairie - 4/15/2021
Date:	Wednesday, April 21, 2021 4:30:00 PM
Attachments:	193708256 High Prairie Mortality Survey 2021_04162021_MYSO.pdf

Jordan,

As Kevin notified you of last week via voicemail, an Indiana bat was found last Thursday, 4/15/2021 at the High Prairie Renewable Energy Center in Adair County, MO. Attached is the datasheet from the fatality with photos and additional info.

Please let us know if you have any questions or need anything else. The bat is currently in route to the Wildlife Health Lab in Madison, WI for necropsy and genetic testing.

Molly

Molly Gillespie Stephenson
Wildlife Biologist

Office: (612) 712-2134
Mobile: (319) 327-0881

Stantec Consulting Services Inc.
733 Marquette Ave., Suite 1000
Minneapolis, MN 55402

193708256 High Prairie Mortality Survey 2021

Submitted by: Tyler.Scherbring@stantec.com_stantec

Submitted time: Apr 15, 2021, 3:32:59 PM

General Info

Survey Date

Apr 15, 2021, 2:31:00 PM

Biologist Name

Tyler scherbring

Turbine ID

M-03

Plot Type

Roads

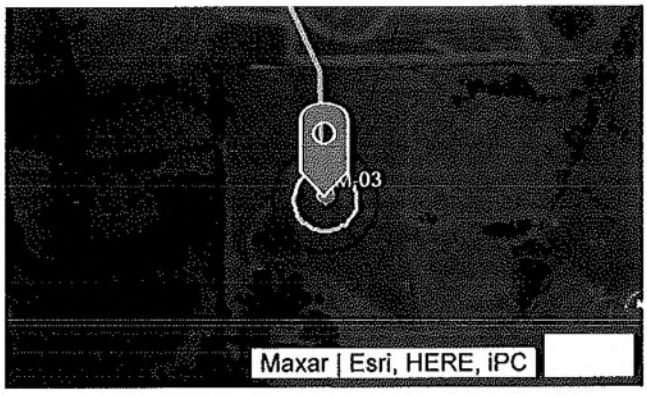
Carcass Present?

Yes

Location

Location

Lat: 40.2707 Lon: -92.47187



speed

0

Carcasses

Carcass Number

1

Incidental

No

Carcass Type

Bat

Bat Species

Indiana Bat

Forearm Length of Bat (mm)

35

Distance from Turbine (m)

1

Azimuth from Turbine (Degrees)

30

Age

Adult

Sex

Female

Cause of Death

Unknown

Condition

Fresh/Whole

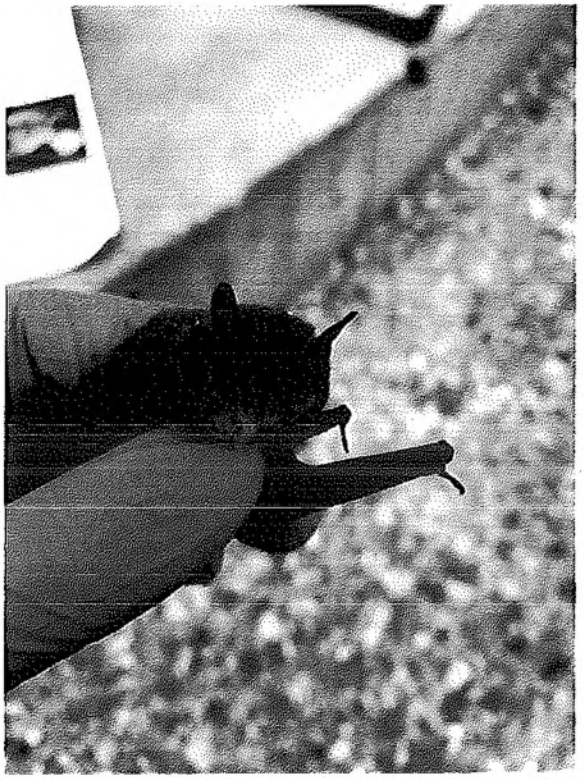
Additional Comments

Unable to get teeth pictures. Toe hairs don't pass nails. Keeled/ slight keel

Photos

Carcass Photo

Carcass Photo

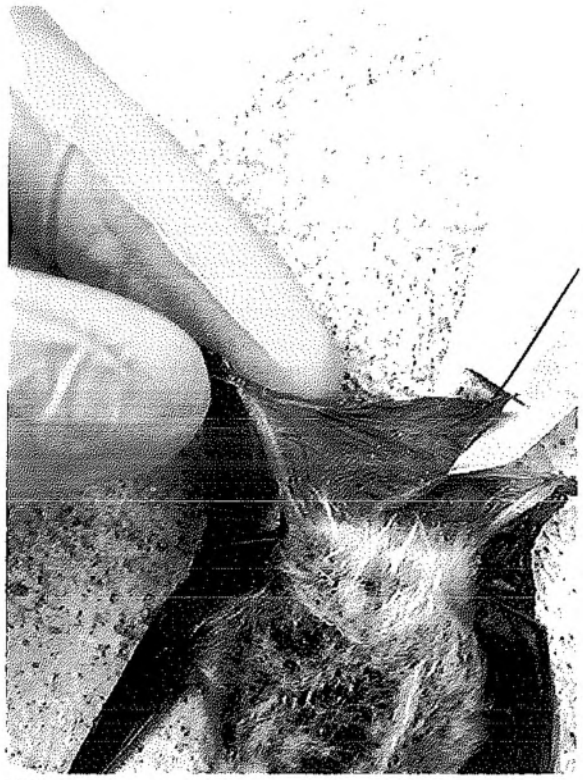


Carcass Photo

Carcass Photo

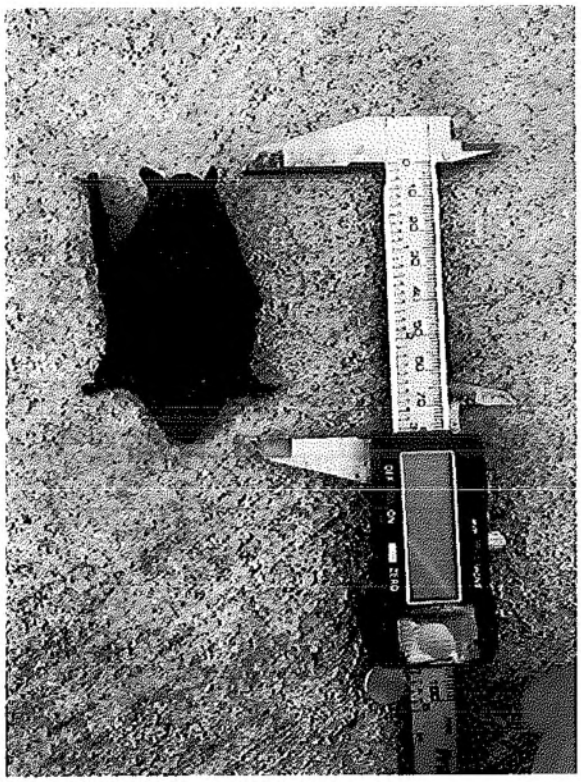
Carcass Photo

Carcass Photo



Carcass Photo

Carcass Photo

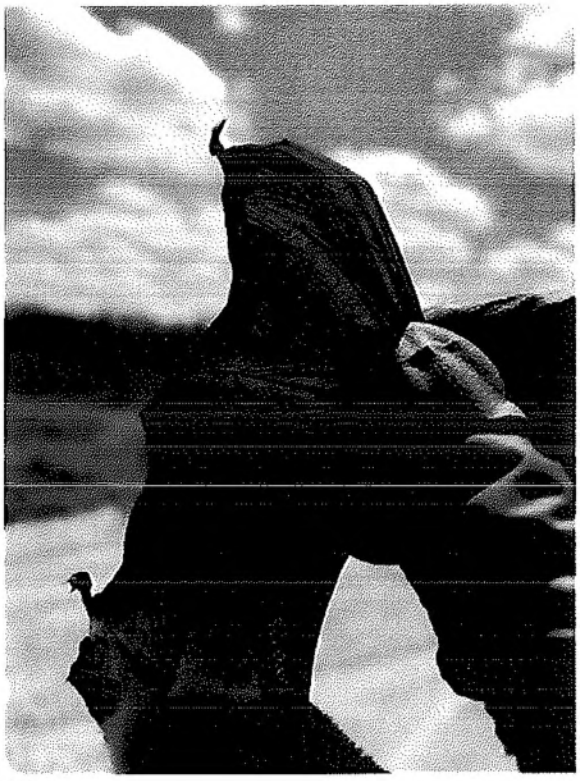


Carcass Photo

Carcass Photo

Carcass Photo

Carcass Photo



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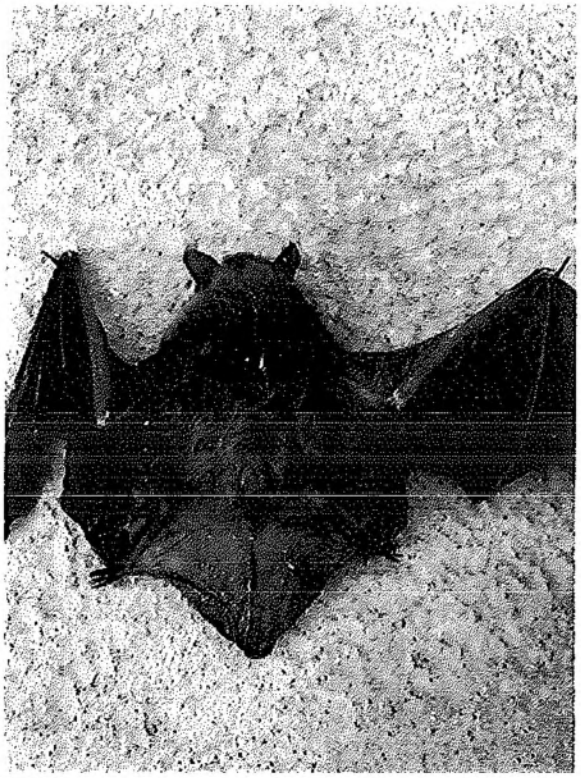
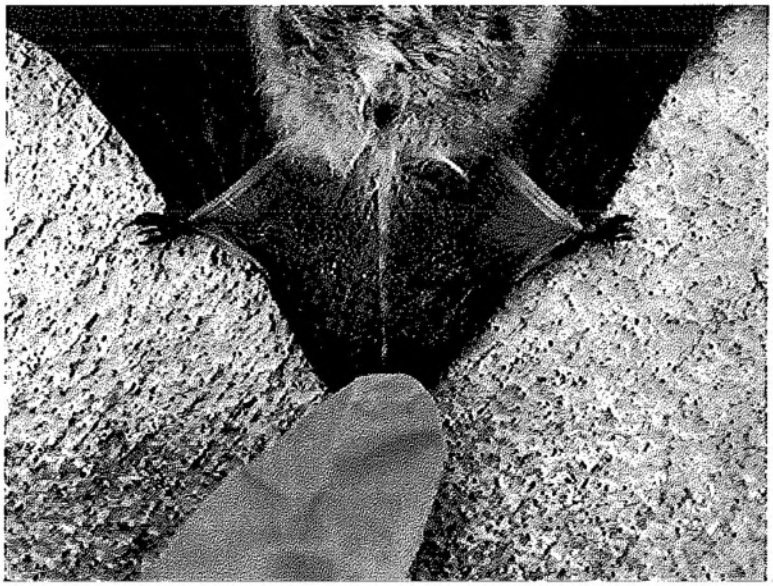
Carcass Photo



Carcass Photo



Carcass Photo

From: Stephenson, Molly
To: Jordan Meyer
Cc: Epplin, Julianne; Terry VanDeWalle (Terry.Vandewalle@stantec.com); Giesmann, Craig J
Subject: High Prairie SOCC Reporting - March 2021
Date: Monday, April 5, 2021 5:17:00 PM

Hi Jordan,

We've been conducting monitoring at the High Prairie Renewable Energy Center since March 15th. During that time, we have found a single potential SOCC carcass. A bat carcass was found on 3/16/2021 that based on forearm length was either a hoary bat or big brown bat, but the carcass was very decayed so a positive species identification could not be made. It is believed the carcass is likely from fall 2020. This carcass was not collected, as we did not yet have our MDC collector permit. We have now received our permits and will be keeping all carcasses found.

Otherwise no SOCC-species have been found. We will keep you posted on any other SOCC fatalities, and we will be sending emails on a weekly basis from here on out (if there is anything to report).

Please let us know if you have any questions, or if there is anyone else we should be notifying (I figured I would start the email chain small, and grow it as needed).

Thanks,

Molly

Molly Gillespie Stephenson
Wildlife Biologist

Office: (612) 712-2134
Mobile: (319) 327-0881

Stantec Consulting Services Inc.
733 Marquette Ave., Suite 1000
Minneapolis, MN 55402

From: Stephenson, Molly
To: Jordan Meyer
Cc: Giesmann, Craig J; Terry VanDeWalle (Terry.Vandewalle@stantec.com); Epplin, Julianne
Subject: High Prairie SOCC Reporting
Date: Monday, April 26, 2021 3:43:00 PM

Jordan,

One additional SOCC species has been found, a silver-haired bat found on 4/19/2021 at Turbine D-01. The bat is currently stored in the freezer at the O&M building.

Please let us know if you have any questions or need any other information.

Thank you,

Molly

Molly Gillespie Stephenson
Wildlife Biologist

Office: (612) 712-2134
Mobile: (319) 327-0881

Stantec Consulting Services Inc.
733 Marquette Ave., Suite 1000
Minneapolis, MN 55402

From: Stephenson, Molly
To: Jennifer Campbell
Cc: Epplin, Julianne
Subject: SOCC Species - High Prairie
Date: Monday, May 17, 2021 4:50:00 PM

Hi Jennifer,

We had our first SOCC bird found, a Virginia Rail found on 5/11/2021 and identified today via photograph.

Is there someone other than you that I should notify of bird SOCC found? I have been notifying Jordan Meyer as needed about bat fatalities on a weekly basis, but I assume he doesn't want to know about birds?

Thanks,

Molly

Molly Gillespie Stephenson
Wildlife Biologist

Office: (612) 712-2134
Mobile: (319) 327-0881

Stantec Consulting Services Inc.
733 Marquette Ave., Suite 1000
Minneapolis, MN 55402

From:	Stephenson, Molly
To:	"jennifer.campbell@mdc.mo.gov"; "Janet.Haslerig@mdc.mo.gov"; karen_herrington@fws.gov; "Hill, Laurel A"; "Rigby, Elizabeth A"; "Rheude, Margaret G"; "KAtkins@ameren.com"; "Epplin, Julianne"; Mark Casper; Terry VanDeWalle (Terry.Vandewalle@stantec.com)
Subject:	RE: Eagle carcass found near High Prairie
Date:	Thursday, May 6, 2021 2:41:00 PM
Attachments:	BAEA_H-06_05032021.pdf

MDC and USFWS,

Attached is the data sheet from the bald eagle fatality. The carcass is currently being stored in the freezer at the O&M building. I am coordinating with Greg Jeffers of USFWS to pick up the carcass.

The turbine had last been visited on 4/29/2021, and our field biologists do not believe there is any way the carcass was there at that time based on how visible it was from the turbine road. The field had been freshly plowed and they did not see any evidence that the carcass had been dragged there by scavengers, though as noted on the data form the carcass was missing the lower half. They searched the area surrounding the turbine to try to locate additional pieces but did not find any.

Let us know if you have any additional questions.

Molly

Molly Gillespie Stephenson
Wildlife Biologist

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733 Marquette Ave., Suite 1000
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-----Original Message-----
From: Stephenson, Molly
Sent: Monday, May 3, 2021 6:56 PM
To: jennifer.campbell@mdc.mo.gov; Janet.Haslerig@mdc.mo.gov
Cc: karen_herrington@fws.gov; Hill, Laurel A <laurel_hill@fws.gov>; Rigby, Elizabeth A <elizabeth_rigby@fws.gov>; Rheude, Margaret G <margaret_rheude@fws.gov>; KAtkins@ameren.com; Epplin, Julianne <JEpplin2@ameren.com>; Mark Casper <mcasper@terra-gen.com>; Terry VanDeWalle (Terry.Vandewalle@stantec.com) <Terry.Vandewalle@stantec.com>
Subject: FW: Eagle carcass found near High Prairie

Jennifer and Janet,

An adult bald eagle carcass of unknown sex was found near High Prairie this evening. Per the email below from USFWS, we will be storing the carcass overnight in the freezer at the O&M building while we await further

instructions. We will follow up with additional details tomorrow.

Thank you,

Molly

Molly Gillespie Stephenson
Wildlife Biologist

Office: (612) 712-2134
Mobile: (319) 327-0881

Stantec Consulting Services Inc.
733 Marquette Ave., Suite 1000
Minneapolis, MN 55402

-----Original Message-----
From: Herrington, Karen <karen_herrington@fws.gov>
Sent: Monday, May 3, 2021 6:40 PM
To: Kevin D Atkins <KAtkins@ameren.com>; Julianne Epplin <jepplin2@ameren.com>; Mark Casper <mcasper@terra-gen.com>; Stephenson, Molly <Molly.Stephenson@stantec.com>
Cc: Rheude, Margaret G <margaret_rheude@fws.gov>; Rigby, Elizabeth A <elizabeth_rigby@fws.gov>; Hill, Laurel A <laurel_hill@fws.gov>
Subject: Eagle carcass found near High Prairie

Kevin,

Thank you for notifying me that Stantec found a dead eagle this afternoon near the High Prairie Renewable Energy Center. As we discussed, I'm asking you to have Stantec collect it and put it in the freezer as soon as possible this evening. I understand that the carcass is partially scavenged and that you do not have a permit to possess the bird. I'm temporarily authorizing this possession until we can give you more direction tomorrow morning. I or someone from the Migratory Birds Division will be in touch as soon as possible tomorrow. Please notify MDC, and let me know if you have questions that need immediate attention.

Karen

Sent from my iPhone

193708256 High Prairie Mortality Survey 2021

Submitted by: Michaela.White@stantec.com_stantec

Submitted time: May 3, 2021, 8:22:09 PM

General Info

Survey Date

May 3, 2021, 5:46:00 PM

Biologist Name

Michaela White

Turbine ID

H-06

Plot Type

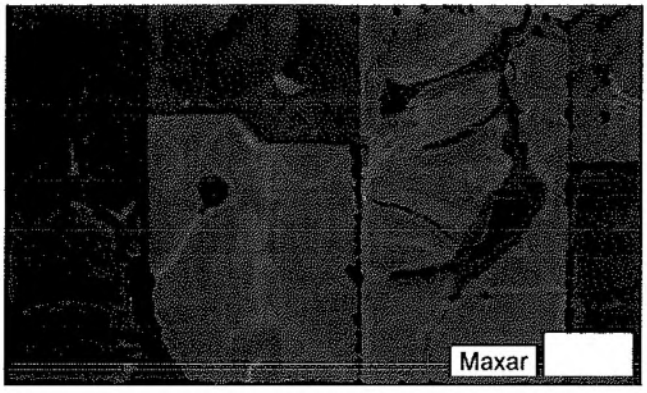
Roads

Carcass Present?

Yes

Location

Location



speed

0.0626615658402443

Carcasses

Carcass Number

1

Incidental

No

Carcass Type

Bird

Bird Species

Bald Eagle

Distance from Turbine (m)

31

Azimuth from Turbine (Degrees)

170

Age

Adult

Sex

Unknown

Cause of Death

Unknown

Condition

Decomposed/Most of Body, Some Missing

Additional Comments

Lower half missing, small maggots present. Been dead for some days. Might have been predated on or possi bly cut in half.

Photos

Carcass Photo

Carcass Photo

Carcass Photo

Carcass Photo

Carcass Photo

Carcass Photo

APPENDIX B

Necropsy Report

NATIONAL WILDLIFE HEALTH CENTER

6006 Schroeder Road
Madison, Wisconsin 53711-6223
608-270-2400 (FAX 608-270-2415)

DIAGNOSTIC SERVICES CASE REPORT

Case: 30207
EpiWID # 201247

Supplemental Report 5/10/2021

Legal ☐ **Declassified** ☐ **INV#:**

Submitter:
Laurel Hill
USFWS Ecological Services/Columbia MO
101 Park De Ville Drive, Suite A
Columbia, MO 65203

Date Submitted: 4/22/2021

Specimen description/Identification/Location:

AC	SPECIES	SPECIMEN TYPE	BAND NUMBER	SUBMITTER's ID	COUNTY	STATE
001	Bat, Indiana	CARCASS			Adair	MO

Diagnosis:

1. White-nose syndrome positive

Event History:

One suspected Indiana Bat was found dead on 4/15/21 at an industrial wind turbine facility (turbine M-03). Site is surveyed weekly; last survey prior to bat detection was on 4/8/21. There had been a rainstorm event in the area on 4/11/21 (evening). At the time of collection, the carcass appeared relatively fresh and not covered in mud/wet, wings pliable but jaws were shut tight and couldn't be pried open. Carcass is being submitted for cause of death determination and WNS surveillance.

5/7/21: Host genetics was completed and species was identified as Myotis sodalis.

Legal ☐ Declassified ☐ INV#:

Comment:

Final report 5/4/21

Death of this adult female Indiana bat is tentatively attributed to white-nose syndrome (WNS) due to the bat's positive WNS status and lack of other clear cause of death. [Note 5/10/21: Species ID was changed from *Myotis* sp. to Indiana bat after genetic confirmation of species].

There were no clear signs of impact trauma, such as bruising, laceration, skeletal or visceral fractures, or herniation. While lungs were dark red, wet, and heavy, this finding can be seen in bats that die from various causes and is not specific to pulmonary hemorrhage. Microscopically, there are increased numbers of macrophages in the lung suggestive of edema, but additional assessment is not possible due to extensive freeze-thaw artifact and autolysis. Barotrauma can neither be confirmed nor excluded; barotrauma can be very difficult to assess on frozen specimens and may have been overdiagnosed on initial reports (Rollins et al., 2012). See Gross, Microscopic, and Diagnostic Findings section below for more detail.

A wing skin swab was positive for *Pseudogymnoascus destructans* by PCR and histopathology of the muzzle and ear revealed lesions of WNS. The brain was negative for rabies by direct fluorescent antibody assay at the Wisconsin State Laboratory of Hygiene.

Several samples were saved frozen and can be returned to the submitter at your request; these include brain, liver, kidney, skin (in 95% EtOH), and gastrointestinal tract with contents. Please contact us if you would like to receive these samples.

Genetic species identification is pending and those results will be reported in a Supplemental Report when available.

Reference:

Rollins KE, Meyerholz DK, Johnson GD, Capparella AP, Loew SS. A Forensic Investigation Into the Etiology of Bat Mortality at a Wind Farm: Barotrauma or Traumatic Injury? Veterinary Pathology. 2012;49(2):362-371. doi:10.1177/0300985812436745

Wildlife and Domestic Animal Significance: This case represents the first confirmation of white-nose syndrome (WNS) in a bat from Adair County although WNS has been recognized in Missouri since 2012. White-nose syndrome is an often fatal disease of hibernating bats and is cumulatively estimated to have caused the deaths of millions of North American bats since its emergence in 2007. The USFWS National and Regional WNS Coordinators are being notified in confidence of this expansion of confirmed WNS in this state. There is no evidence that WNS poses a health risk to other wildlife or domestic animals.

Human Health Considerations: None known.

Disease Control and Biosecurity: Bats are most commonly exposed to *P. destructans* while over-wintering in a contaminated hibernaculum. Although this bat was not found in direct association with a hibernaculum, additional monitoring for disease at potential hibernacula in the area may be appropriate. Adherence to the most current National WNS Decontamination Guidelines (<<<<http://whitenosesyndrome.org/topics/decontamination>>>>) is recommended to avoid contamination of uncontaminated sites.

The NWHC and the USFWS are conducting surveillance and research on this emerging disease. Please contact Anne Ballmann (aballmann@usgs.gov, 608-270-2445) to discuss options for additional surveillance of hibernacula in your area to further assess the extent of *Pd* dispersal and WNS progression in the U.S.

GROSS, MICROSCOPIC AND DIAGNOSTIC FINDINGS:

ACCESSION 001

GROSS FINDINGS:

External examination: A 6.89 g adult female *Myotis* sp. in poor body condition and fair postmortem condition is examined at necropsy. Forearm length is 37.92 mm.

There are scattered pinpoint white foci on the wings and tail. Within the left plagiopatagium just ventral to the mid-humerus near the body is an ~2 mm diameter slightly raised white area ventrally and slightly sunken white area dorsally (suspect erosion). In the first phalanx of the left fifth digit approximately 1 cm above the first interphalangeal joint is an area of mild enlargement with ventral displacement of the distal portion (suspect healed fracture site). At this site, the digit is enlarged to 1 mm diameter (vs. ~ 0.5 mm diameter for normal digit) and there is a sunken area on the ventral aspect that is ~ 0.5 mm wide by 1 mm long. The nose contains dark red fluid and the fur on the top of the muzzle is matted with light red fluid. The ventral abdomen is damp (suspect stained by fluid from nose). On examination under ultraviolet light, there are two small (4-5 mm diameter) areas of dull white-orange fluorescence on the right ventral wing between digits 4 and 5 last 2 digits and on the left dorsal tail.

Internal examination: There are subcutaneous fat pads on the dorsal shoulders bilaterally (~5x5x10 mm); no other fat stores remain. Pectoral muscle is within normal limits. The trachea contains dark red fluid along its length. Lungs are diffusely dark red and sink in formalin. The inner sternum and epicardium is stained dark red. There is a suspect small thymus. Liver, kidneys, and spleen are moderately pale tan and soft (autolysis). Uterus and ovaries are small. The stomach is distended with abundant (~2 ml) thick dark brown fluid (did not open - saved frozen intact). The small intestine contains a moderate amount of tan pasty material. The large intestine contains a moderate amount of dark brown to black pasty material. The brain and middle ear are not examined (submitted for rabies testing). All tissues not described are within normal limits.

MICROSCOPIC FINDINGS:

Muzzle: Epidermal erosions with intralesional fungal hyphae, multifocal, moderate
Pinnae: Otitis externa, neutrophilic and erosive, with intralesional fungal hyphae, multifocal, moderate to marked
Wing: Dermatitis, neutrophilic, erosive, multifocal, minimal, with focal fungal hyphae
Wing: Dermatitis, neutrophilic, erosive, focal, subacute, moderate, with suspect fibrosis
Lung: Edema, suspect
Tissues, multiple: Autolysis and freeze artifact, marked

Case: 30207
Epi/WID # 201247

Supplemental Report 5/10/2021

Legal ☐ **Declassified** ☐ **INV#:**

DIAGNOSTIC TEST RESULTS:
Microbiology: Skin swab, *Pseudogymnoascus destructans* PCR: Positive
Parasitology: N/A
Chemistry: N/A
Virology: Brain, rabies virus, direct fluorescent antibody testing: Negative (Wisconsin State Laboratory of Hygiene)

Supplemental report 5/10/21
Species was confirmed as Indiana bat (*Myotis sodalis*) by mitochondrial DNA analysis (cytochrome b gene) of skeletal muscle.

Julia S. Lankton DVM, DACVP
Staff Pathologist
Phone: 608-270-2459 **Email:** jlankton@usgs.gov

The USGS-National Wildlife Health Center conducts wildlife disease investigations with state, federal and tribal partners, and we welcome collaborative dissemination of this information (e.g., publication, press release, technical report, etc.). Please contact the pathologist or wildlife disease epidemiologist assigned to this case to ensure that information is accurately interpreted and appropriately credited.

Copies To:

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This is a Report for your submission to the National Wildlife Health Center.

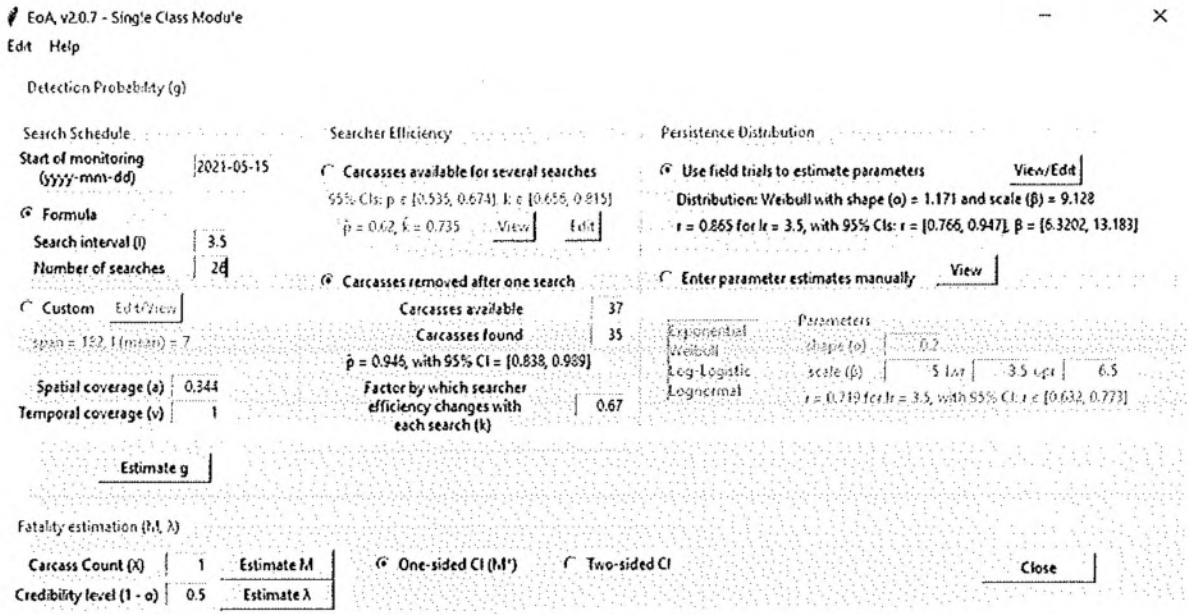
For consultation regarding diagnostic findings or laboratory testing and results, please contact the pathologist. Contact information can be found underneath the signature line on this report.

For consultation on the significance of this disease to wildlife populations in your area, assistance with disease control and response, or to report field updates (numbers and species affected, geographical distribution, end date, etc.), please contact an NWHC epidemiologist at NWHC-epi@usgs.gov or 608-270-2480.

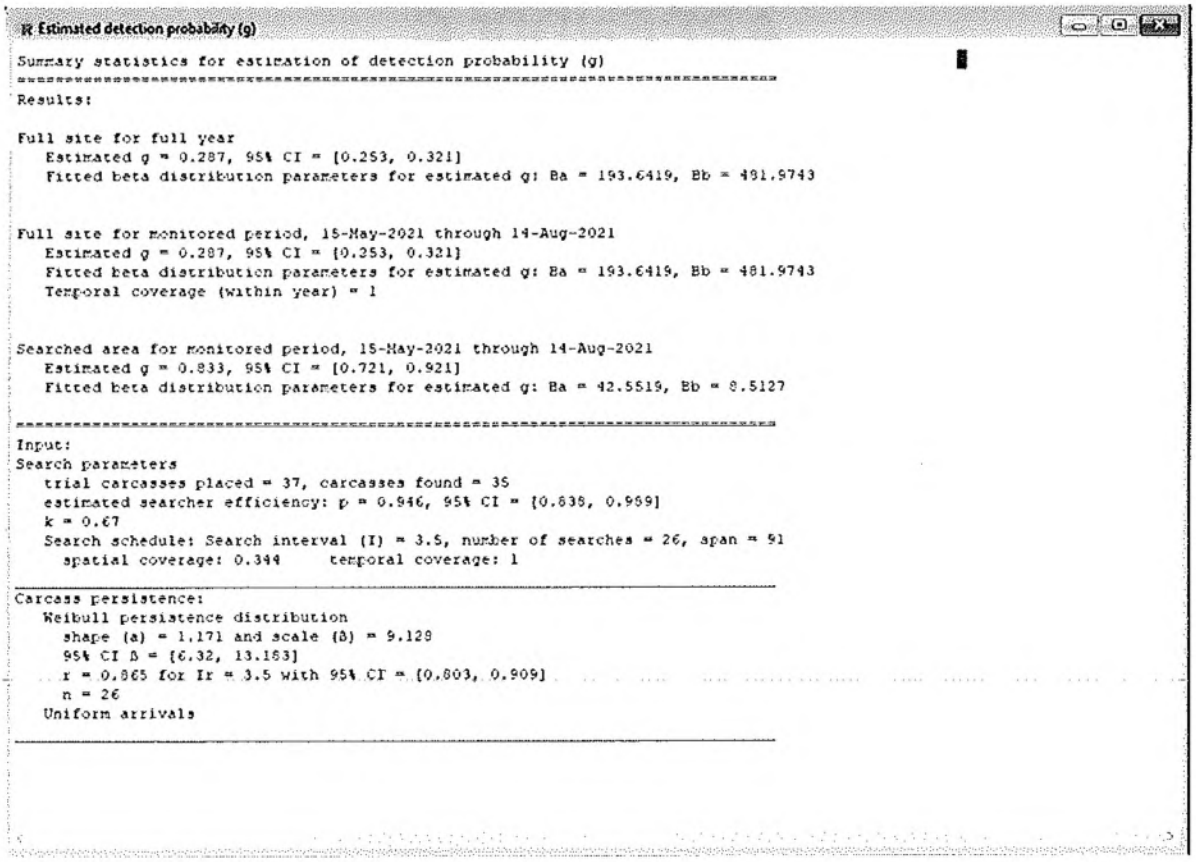
APPENDIX C

Screenshots from Evidence of Absence

Screenshot of EofA Inputs:



Screenshot of EofA Outputs:



Ameren Illinois
Voltage Optimization Plan

January 25, 2018

Ameren ILLINOIS

1. Executive Summary

Under 220 ILCS 5/8-103B(b-20) of the Future Energy Jobs Act ("FEJA," SB 2814, 2016), Ameren Illinois Company d/b/a Ameren Illinois is required to file "a plan with the Commission that identifies the cost-effective voltage optimization investment the electric utility plans to undertake through December 31, 2024." The statute requires that Ameren Illinois file its voltage optimization plan (the "VO Plan") within 270 days of the effective date of FEJA, or by February 26, 2018.

"Voltage optimization measures" are included in the overall "energy efficiency" definition in the IPA Act at 20 ILCS 3855/1-10, and described as "measures that optimize the voltage at points on the electric distribution voltage system and thereby reduce electricity consumption by electric customers' end-use devices." Ameren Illinois defines Voltage Optimization ("VO") as a combination of Volt/VAR Optimization ("VVO") and Conservation Voltage Reduction ("CVR"), which are implemented to first reduce the VAR flows on a circuit, and then lower the voltage to reduce end-use customer energy consumption and utility distribution system losses. VVO optimizes capacitor bank operations to improve power factor and reduce system losses. CVR utilizes voltage regulators, transformer load tap changers, and capacitors to control and reduce end-user voltages, which, in turn, lowers customers' energy consumption.

Ameren Illinois' VO team identified distribution circuits' average delivered energy[1] and categorized those circuits by operating voltage levels. The team then researched, studied, and analyzed industry accepted methodologies that could be used to quantify potential cost-effective VO energy savings of the entire Ameren Illinois distribution network. The result of these efforts is this VO Plan. The VO Plan incorporates a Total Resource Cost (TRC) analysis consistent with Ameren Illinois' energy efficiency plan to determine the cost-effectiveness of VO deployment on each individual circuit. At a very high level, a TRC analysis compares total resource costs (capital and O&M investments) to total resource benefits (primarily energy savings achieved by customers). When a project's total benefit exceeds total costs, the project is considered cost-effective, using the TRC methodology.

- **Key Findings**
  - A VO program deployment on Ameren Illinois' distribution network has the potential to cost-effectively achieve energy savings of an estimated 422 GWh per year by the end of 2025 and has a Plan TRC of 1.36.
  - These VO measures statutorily have a 15-year useful life for purposes of claiming energy savings; thus, AIC is committed to ensuring the VO program continues to produce savings through 2039 for those circuits deployed in 2024.

[1] Average delivered energy on a circuit is based on the customers currently served from the circuit using billing data for the years 2014-2016.

- The population of cost-effective candidate circuits for the VO program deployment is currently estimated at 1,047 circuits, which corresponds to approximately 64% of Ameren Illinois' customers.

- Ameren Illinois will annually refine the appropriateness and timing of deployment of each of these VO candidate circuits using detailed engineering studies and analysis, to achieve its yearly savings targets.

- The cost-effective VO program investment is estimated at approximately $122 million over the period of years 2017-2024. All reasonable and prudently incurred costs, fees, and charges, including, but not limited to, capital and associated O&M costs associated with this VO Plan shall be recovered under the provisions of Section 16-108.5.[2]

- **Approach**

  Ameren Illinois' approach for the VO Plan was designed using proven industry standards for estimating and quantifying cost-effective energy savings on Ameren Illinois' distribution network. Ameren Illinois relied on its previous VO pilot project experiences, recent industry VO activities, as well as recommendations from leading VO experts to create the VO Plan.

  Ameren Illinois' VO Plan has the following attributes:

  - Ameren Illinois, consistent with other EE programs, will use a TRC analysis as the main tool to determine the cost-effective VO circuits.

  - Ameren Illinois used voltage level as the primary criteria for establishing the initial pool of potential candidate circuits to analyze. Circuits served by voltage levels greater than 20 kV are not considered candidates for VO implementation. Based on this criteria, 2,474 distribution circuits were considered for further analysis.

  - Ameren Illinois used a CVR factor of 0.8 and an average voltage reduction of 3% to estimate the end-use customer energy savings per circuit. Ameren Illinois' CVR factor and percent voltage reduction are based on its VO pilot project results, recent VO industry findings, as well as VO industry expert recommendations. This approach of estimating the energy savings per circuit was used in the analysis.

  - This Ameren Illinois VO Plan is being designed and implemented as an energy efficiency measure, consistent with FEJA. The VO functionality is intended to operate 24 hours a day, 365 days a year. The analysis, CVR factor, and

[2] Costs associated with this plan will continue to be recovered until fully recovered under provisions of Article IX, in the event Section 16-108.5 no longer applies.