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Issue(s):	Response to Rebuttal Testimonies
Witness/Type of Exhibit:	Marke/Surrebuttal
Sponsoring Party:	Public Counsel
Case No.:	EO-2018-0092

SURREBUTTAL TESTIMONY

OF

GEOFF MARKE

Submitted on Behalf of the Office of the Public Counsel

EMPIRE DISTRICT ELECTRIC COMPANY

CASE NO. EO-2018-0092

March 13, 2018

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of The Empire District Electric Company for Approval of Its Customer Savings Plan	)))	Case No. EO-2018-0092

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 Regulatory Economist for the Office of the Public Counsel.

2. Attached hereto and made a part hereof for all purposes is my surrebuttal 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
Geoff Marke
Chief Economist

Subscribed and sworn to me this 13th day of March 2018.

NOTARY PUBLIC
NOTARY SEAL
STATE OF MISSOURI
JERENE A. BUCKMAN
My Commission Expires
August 23, 2021
Cole County
Commission #13754037

Jerene A Buckman
Jerene A. Buckman
Notary Public

My commission expires August 23, 2021.

TABLE OF CONTENTS

SURREBUTTAL TESTIMONY

OF

GEOFF MARKE

EMPIRE DISTRICT ELECTRIC COMPANY

CASE NO. EO-2018-0092

I. INTRODUCTION

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

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

Q. Are you the same Dr. Marke that filed rebuttal testimony in this Case No. EO-2018-0092?

A. I am.

Q. What is the purpose of your testimony?

A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimonies of:

- The Missouri Division of Energy ("DE") witness Martin R. Hyman;
- The Midwest Energy Consumers Group ("MECG") witness Greg R. Meyer;
- Renew Missouri's witness James Owen; and
- OPC's updated concerns regarding the ancillary considerations I raised in my rebuttal testimony.

Q. What is OPC's recommendation?

A. OPC is expanding its recommendation that was filed in rebuttal testimony that the Commission reject the "Customer's Savings Plan" due to the heightened risk to ratepayers and the uncertainty regarding the terms of the transaction to also recommend the Commission find the plan imprudent. The espoused benefits continue to be overstated and are dependent on modeling assumptions that have eroded even further since the parties filed rebuttal testimony on February 7, 2018.

II. RESPONSE TO THE MISSOURI DIVISION OF ENERGY

Q. What is DE's position?

A. DE generally supports The Empire District Electric Company's ("Empire") proposed Customer Savings Plan with three notable exceptions: 1.) DE takes no formal position on Empire's requested accounting treatment regarding the Asbury plant or on the use of tax equity financing; 2.) Empire's modeling involving demand-side management ("DSM") programs is improperly accounted for; and 3.) Five "economic development" provisions DE recommends be put in place including a one-time cash infusion for local/county/state tax revenue from the Asbury plant along with various worker "re-education/location" provisions for the Asbury employees. I respond to DE's endorsement as well as the three previously stated exceptions in turn.

Q. What is OPC's response to DE's general endorsement of Empire's proposal?

A. OPC notes DE's lack of independent analysis in arriving at its recommendation. Mr. Hyman's testimony appears to want to have it both ways. He restates the savings assumptions Empire espouses and thus implies they are correct and above reproach (e.g., "This modeling showed savings…", "according to the Company…", "Empire has stated…"), but then he takes issue the specific modeling associated with Empire's DSM. More importantly, Mr. Hyman's analysis takes no position on the accounting treatment of Asbury or the terms surrounding the tax equity partnership.[1] This begs the question of whether or not Mr. Hyman's testimony could properly be described as an unbiased, thorough analysis of the proposal if it is void of key inputs in reaching those favorable outcomes. Putting those large caveats aside (at least as it pertains to Asbury and the tax equity partnership), Mr. Hyman then takes as a given, that Empire's proposal is the least-cost option for its customers.

[1] OPC witness John S. Riley explains in his surrebuttal testimony how the accounting and tax equity partnership are directly tied to Empire's purported benefits to its customers and therefore, the claimed customer benefits should not be accepted without a careful review of these aspects of Empire's plan.

It is not clear how this selective conclusion can objectively be relied on. Other general statements populated in Mr. Hyman's testimony require further commentary. For example, in describing the SPP Integrated Market, Mr. Hyman states:

> In fact, the Southwest Power Pool has demonstrated the capability to reliably adjust to large amounts of wind energy on its system.[2]

This statement is true, but his citation of SPP's ability to reliably adjust large amounts of wind (52.1%) omits that this demonstration was achieved at 4:30 AM on February 12, 2017. That is, during an hour of the day and time of year when demand is very low and wind is plentiful. Stated differently, a single hour that is not subject to sweeping price volatility and technology constraints to meet peak demand.

Another troubling statement Mr. Hyman puts forward is his belief that previous capital investments are irrelevant considerations to moving forward with Empire's plan,

> Such previous investments in environmental compliance [for Asbury] represent "sunk costs" in economic terms, meaning that they are not relevant to future decision-making about the Asbury plant's operations.[3]

This is a very dangerous line of thinking. First, it is technically wrong. In addition to the environmental upgrades, Asbury's steam turbine was retrofitted and upgraded resulting in Asbury being more efficient moving forward. Although it is true that Empire has recently invested approximately $124 million dollars in retrofits to Asbury, per, Empire's Customer Savings Plan, Empire ratepayers will still be paying for the environmental compliance and turbine upgrade costs for the next thirty years. For ratepayers, this investment was not a one-time expense that is no longer relevant (i.e., "a sunk cost") but an on-going expense to be present in rate base for another generation. Stated differently, whether or not Mr. Hyman wants to acknowledge it, the accounting treatment, prudency and cost allocation of Asbury matters—especially if the decision to adopt Empire's proposed customer savings plan is predicated on

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[2] EO-2018-0092 Rebuttal Testimony of Martin R. Hyman p. 4, 7-9.
[3] Ibid., p. 6, 13-15.

prematurely retiring Asbury, and forcing it to become a stranded asset that Empire's customers are required to pay for.

Second, this line of thinking is also be at odds with previous testimony Mr. Hyman has put forward when he has argued in favor of the economic considerations associated with "sunk costs" related to the promotion of ratepayer-funded energy efficiency programs; specifically, citing to costs related to program administration, design, and marketing of energy efficiency programs, most notably in the recent Spire general rate cases (Case No. GR-2017-0216 and GR-2017-0217). That is, energy efficiency programs should be approved, in part, because the sunk costs in administrative overhead would be lost if the utility ceased program activity.

Q. Does Mr. Hyman make any statements that OPC can agree with that the Commission should be aware of?

A. Yes. Mr. Hyman does make a passing statement that OPC agrees with but this statement also merits further elaboration. It follows:

> This transition will also support future local decisions to increase the use of renewable energy.[4]

This declarative statement will most likely be correct if Empire's plan is adopted. Based on OPC's analysis of the Empire's proposal, Commission approval of the plan would shift risk from shareholders to ratepayers. Empire's cost-of-service would include both a return on and return of the stranded asset (Asbury), some, as yet undetermined cost associated with the new wind generation, as well as increased volatility in market prices, and/or future complementary generation. Restated, Empire's ratepayer's bills will likely increase if the Commission approves Empire's proposed plan in future rate case more than they would otherwise. Those increased bills will no doubt encourage some customers to elect to invest in rooftop solar, which will further increase bills for those customers who cannot take advantage of that alternative. Inequities and cost/risk shifting will be accelerated, and will also likely result in future rate increases which will only further exacerbate that trend.

[4] Ibid. p. 9, 7-8.

Q. What is OPC's response to DE's failure to address Empire's accounting treatment of Asbury and use of tax equity financing?

A. DE's recommendation is based upon selectively choosing the inputs associated with the modeling outcome and ignoring major costs to achieve its desired results. It is inappropriate and misleading of Mr. Hyman to make the following comment:

> These economic benefits will result from the reduced revenue requirement (and rates) paid by Empire's customers, as well from the construction and operation of wind facilities in Missouri (if such facilities are, in fact, constructed in Missouri).[5]

Today, there is/are no tax equity partner(s), there is/are no defined wind farm location(s), there are no agreements with wind generation contractors, no terms have been negotiated and the SPP market is increasingly becoming saturated with intermittent wind generation. Consider for a moment, that no one to this case can definitively answer this question: "How much this will cost?" At best, Empire's savings model can put forward a range of expected benefits—benefits that can only be achieved if everything conforms to the model's assumptions.

The Commission should be mindful that models are contain simplifications and assumptions about the real world. Some aspects are discounted as insignificant while others are emphasized. Perhaps the most important element in any model outcome is the ability to validate and verify those assumptions based on what is observed in the real world. If the model doesn't comport with what is actually happening then the model needs to be refined. It remains to be seen whether Empire will make categorical changes to its model based on what was filed (or observed) by parties in their rebuttal testimony. It bears repeating that Empire's "savings assumptions" are far out into the future and are predicated on a stable, static policies and market reality moving forward.

Perhaps DE will file surrebuttal testimony that fully attempts to analyze all relevant factors that includes taking a formal position on the accounting treatment of Asbury and the uncertainty

[5] Ibid. p. 7, 7-10.

surrounding Empire's plan as it pertains to its impact on its customers. No doubt, all parties, including DE, have been constrained by the accelerated nature and limited amount of time to properly vet Empire's proposal.

Q. Does OPC agree with DE's position on Empire's DSM modeling?

A. Yes, but OPC's conclusions are different.

Q. How?

A. Mr. Hyman correctly points out that Empire's characterization of the realistically achievable potential ("RAP") demand-side programs is not modeled appropriately as a proxy for a Commission-approved Missouri Energy Efficiency Investment Act ("MEEIA") programs, but instead, as the "business-as-usual" DSM programs that are currently in place, and set from Empire's last rate case.

The difference is not trivial. If Empire were to cease its "business-as-usual" presently approved DSM programs then costs would decrease and savings would increase for all customers. If, on the other hand, Empire includes a MEEIA-like RAP estimate into its modeling, then the costs would increase for all customers and the savings from this modeling exercise would decrease.

Q. Why?

A. Because Empire's customers do not need to add generation under its current preferred resource plan, and they do not need the additional generation put forward in this plan. The economic argument for DSM is predicated on deferring future investment, not adding more generation when load is not increasing or supply-side units are not at the end of their useful life.

There are additional concerns surrounding Empire's ability to effectively implement DSM programs at an appropriate scale which were addressed at length in Empire's filed resource plan. That analysis showed a MEEIA-approved program for Empire would not be cost effective due in part to the unique circumstances surrounding the customers it serves (both largely rural and void of commercial/industrial-eligible customers) and the large amount of capital Empire invested into its existing supply-side units to make them more efficient (see also the aforementioned Asbury retrofits and the Riverton 12 conversion).

Q. Does OPC support DE's five "economic development" provisions?

A. OPC does not support Empire's proposal, and the addition of DE's economic development provisions does not alter our position. That being said, further details on these provisions are necessary before OPC could opine on the appropriateness of these recommendations. For example, how much money is DE's one-time cash infusion for local schools? Between Empire's shareholders and customers who will bear the costs associated with these provisions? Does DE's position change if the wind generation is not sited in Missouri? As presently put forward, DE's proposal lacks the necessary detail for OPC to form an opinion.

III. RESPONSE TO THE MISSOURI ENERGY CONSUMER GROUP

Q. What is MECG's position?

A. MECG recommends that the Commission not approve Empire's Customer Savings Plan. MECG witness Meyer's testimony centers, in part, on his concern:

> About the growth of wind generation is SPP and its effects on market prices included as a revenue requirement offset in the CSP [Customer Savings Plan].[6]

Q. Does OPC share Mr. Meyer's concern?

A. Yes. Mr. Meyer's analysis is consistent with OPC's position throughout this case. In my rebuttal testimony I called into question Empire's insufficient, conservative modeling of the high wind, low coal scenario and expressed concern that if Empire's modeling suggests retiring significant amounts of base load generation is prudent, then the modeling of other SPP members would show similar results; and, if acted upon, would minimize the hoped-to-be gained benefits from Empire's plan.

To illustrate that point, I cited the omission of recently entered into power purchase agreements for wind generating units for Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company, the omission of Empire's planned retirement of Asbury in its

[6] EO-2018-0092 Rebuttal Testimony of Greg R. Meyer p. 30, 6-7.

own modeling and other illustrative examples, including the weighted probability Empire used for specific projects.

Q. Do you have any updates to that analysis?

A. Yes. Since the parties filed rebuttal testimony, American Electric Power's ("AEP") two GW Oklahoma sited, "Wind Catcher" wind farm has entered into an agreement with the parties to its application for preapproval in Arkansas, but an Oklahoma administrative judge has rejected preapproval and casted doubt on the ultimate outcome of what would be the largest wind farm in the U.S. The full inclusion of the two GW Wind Catcher farm in SPP alone would account for 30% of the probability-weighted capacity assumed in Empire's "high wind" scenario and would no doubt impact Empire's proposal if built.[7]

Q. Did anyone in any of the Wind Catcher case express concern regarding the validity of the savings assumptions of that proposal with the subsequent announcement of Empire's Customer Savings Plan?

A. Yes. The Oklahoma Corporation Commission Public Utility Division Staff's witness, Frank Mossburg (Managing Director with Bates White Economic Consulting) arrived at a conclusion similar to OPC's. In his responsive testimony in the Wind Catcher case (Oklahoma Cause No. PUD 201700267) filed on December 4, 2017, Mr. Mossburg states:

> Another topic could be "scenarios" or potential combinations of events that add up to a given future. For example, **take the risk of price collapse driven by new entry. If all utilities have the same outlook as PSO [Public Service Company of Oklahoma, an affiliate of AEP] then they, too will try and acquire as much PTC qualified wind as possible, leading to a steep drop in prices.** This risk ties to PSO's assumptions about new entry, which I discuss later in this testimony. **For example Empire Electric District Company**,

[7] Windcatcher represents 2,000 MW while, Empire's "high wind" weighted-probability scenario assumed 6,537 MW of wind coming online in SPP. There are 95 other "potential" project sites of various sizes listed with different weighted probabilities assigned. As stated in my rebuttal testimony, OPC believes the number of "potential" project sites are grossly understated.

> which serves electricity customers in Oklahoma, Kansas, Arkansas, and Missouri, announced on November 1, 2017 that it plans to expand its wind portfolio by 800 MW by the end of 2020, with projected savings between $150 million and $300 million over a twenty-year period. . . . Even if just a portion of these projects in Oklahoma and other SPP states come on-line the likely result is far more than 3,170 MW of new wind in 2025. **This is particularly true if, as discussed earlier, other utilities are looking at analysis similar to PSO and coming to the same conclusion that they must up their purchases of wind-based power prior to PTC expiration. The resulting rush to lock in low-priced wind deals would bring about a wave of new entry and, presumably, have the effect of depressing market prices and lowering the benefits of additional development.**[8](emphasis added)

Q. Are there important differences between the two GW Wind Catcher farm and Empire's 800MW Customer Savings Plan that this Commission should consider?

A. Yes. Despite being more than double Empire's planned generation (2,000 MW vs Empire's 800 MW), Wind Catcher differs from Empire's proposal in several meaningful ways. For example, AEP is not seeking a tax equity partnership to offset capital costs. AEP knows exactly where the location will be sited. AEP has presented the associated costs for construction and transmission and expected capacity factor to be obtained for the wind farm. In contrast, Empire's proposal is void of these relevant details and may likely remain that way well after the Commission rules on this case.

The lack of details associated with Empire's proposal makes it difficult, if not impossible to design appropriate consumer protections, such as those parties entered into in the Arkansas Wind Catcher case. To illustrate, one of the consumer protections the parties agreed to and the Arkansas Commission imposed in the Arkansas AEP Wind Catcher case is a cost cap, but, because associated costs are unknown in this case, OPC cannot propose a suitable cost cap to

[8] Oklahoma PUD 201700267 Responsive Testimony of Frank Mossburg, p. 15, 7-15 & p. 29, 8-14.

protect ratepayers if Empire's cost estimates are overrun.[9] In fact, the lack of such details provides Empire with a perverse incentive to increase construction costs if the Commission does grant its request in this case; thereby increasing rate base and, therefore, rates for cost recovered from its customers. This outcomes ensures a greater return on Empire's investment and a higher earnings per share for Empire's shareholders.

To illustrate the reasonableness of OPC's cost uncertainty concerns, consider that Ameren Missouri has publicly announced that it plans to build out 700MW of wind for approximately $1 billion dollars.[10] Empire, in contrast, has put forward cost estimates of approximately $1.5 billion for 800MW of wind; however, both Empire and Ameren Missouri's costs, locations, and generating unit's efficiencies (capacity factors) are all subject to change based on the contracts they can ultimately secure. That being said, a half-a-billion dollar cost differential between these two utilities of vastly different sizes should give all parties and the Commission pause.

IV. RESPONSE TO RENEW MISSOURI

Q. What is Renew Missouri's recommendation regarding the treatment of cost savings to Empire's customers due to the passage of the federal Tax Cuts and Jobs Act of 2017?

A. Mr. Owen recommends that Empire:

> amend its application to include a request for an accounting authority order to record and defer the dollars associated with changes to the federal tax law until the effective date of rates for its next rate case.[11]

[9] See also Arkansas PSC Docket No. 17-038-U

[10] Gray, B. (2017) Ameren Missouri to spend $1 billion on wind generation projects. *St. Louis Post Dispatch*. http://www.stltoday.com/business/local/ameren-missouri-to-spend-billion-on-wind-generation-projects/article_08660e51-31e1-5ba3-a156-fb26769b75d6.html

[11] EO-2018-0092 Rebuttal Testimony of James Owen p. 9, 6-8.

Q. What is OPC's response?

A. OPC is generally supportive of the spirit of this idea, but not as a condition for support of Empire's unsuitable proposal. In my rebuttal testimony I articulated OPC's disappointment in Empire's response to the Commission regarding the flow-back of customer savings rightfully due to ratepayers as a result of this historic drop in federal taxes.

The message from Empire appears to be clear, when it comes to saving its ratepayers money, Empire claims it is not possible outside of a rate case; however, when it comes to generating money for Empire shareholders, anything is possible, especially on an accelerated schedule. Empire's rates continue to appear to no longer be just and reasonable, and OPC's limited resources continue to be tied up in the wrong Customer Savings Plan.

V. REVISED ANCILLARY CONSIDERATIONS

Q. Has OPC reviewed Empire's bird and bat impact studies?

A. We have reviewed Empire's RFP's, but have not seen the results of the studies. Presumably, these studies are still taking place.

Q. Does Missouri support robust conservation efforts?

A. Yes. Support might be an understatement. The Missouri Department of Conservation is arguably one of the most securely funded state departments, yet receives no general revenue funds. The Department of Conservation's budget is funded entirely from the State's Conservation Commission Fund. That fund includes revenue from hunting and fishing permits, commercial permits, nonresident permits, federal assistance and the Conservation Sales Tax. The Conservation Sales Tax, part of ballot initiative that led to a 1976 constitutional amendment, allows the Department of Conservation to receive a 1/8-cent sales tax that has flowed more than $2 billion in Department of Conservation funding since its inception and led to the repopulation of the State's deer and turkey species as well as to stock lakes and streams with millions of fish each year from 11 hatcheries.[12]

Q. Please provide some context for Missouri's bat population?

A. It is estimated that there are 14 species of bats in Missouri. Of those 14 species, 8 are considered either vulnerable extirpation or endangered to extinction. They including the following:

1. Little brown myotis (*Myotis lucifugus*) vulnerable to extirpation from Missouri and to extinction globally;
2. Gray myotis (*Myotis grisescens*) endangered;
3. Southeastern myotis (*Myotis austroriparius*) critically imperiled in Missouri, vulnerable/apparently secure globally;
4. Northern long-eared myotis (*Myotis septentrionalis*) endangered in Missouri, threatened federally;
5. Indiana myotis (*Myotis sodalist*) endangered;
6. Eastern small-footed myotis (*Myotis leibii*) imperiled in Missouri, critically imperiled/vulnerable to extinction globally;
7. Silver-haired bat (*Lasionycteris noctivagans*) vulnerable to extirpation in Missouri;
8. Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) critically imperiled in Missouri, vulnerable/apparently secure globally;
9. Tri-colored bat (*Perimyotis subflavus*);
10. Big brown bat (*Eptesicus fuscus*);
11. Eastern red bat (*Lasiurus borealis*);
12. Hoary bat (*Lasiurus cinereus*)
13. Evening bat (*Nycticeius humeralis*); and
14. Townsend's big-eared bat (*Corynorhinus townsendii*);

Additionally, there are three species of possible occurrence in Missouri including:

[12] Missouri Department of Conservation (2016) 2015-2016 Budget Request with Governor's Recommendations. https://oa.mo.gov/sites/default/files/FY_2016_Conservation_Budget_Request_Gov_Rec.pdf

1. The Brazilian free-tailed bat (*Tadarida brasiliensis*);
2. The big free-tailed bat (*Nyctinomops macrotis*); and
3. The Seminole bat (*Lasiurus seminolus*) [13]

Referencing "new" threats facing Missouri's bat population, the Missouri Department of Conservation states:

> Current threats to bats in North America include habitat loss and degradation, cave disturbance, and the use of pesticides, all of which have been threats to our bat populations for many years; however, **two new threats are causing noticeable declines: wind power** and white-nose syndrome.
>
> **Wind turbines cause mortality to bats** and birds. **The prominent causes for bat mortality have been identified as direct collision resulting in bone fractures and barotrauma, the damage to body tissue due to the abrupt change in pressure close to wind turbines.[14]** [15](emphasis added)

Q. What does the Missouri Department of Conservation mean by saying wind turbines cause barotrauma in bats?

A. That means that most bat fatalities were caused by internal hemorrhaging from rapid or excessive pressure change on the lungs. Stated differently, most bat fatalities at wind turbines occurred without any direct contact with turbine blades.[16]

Q. Please provide some context for Missouri's bald eagle population?

A. From 1981 to 1990, the Missouri Department of Conservation ("MDC"), in cooperation with United States Fish Wildlife Service ("USFWS") and the Dickerson Park Zoo in Springfield, released 74 young bald eagles in Missouri to reestablish them as nesters. Prior

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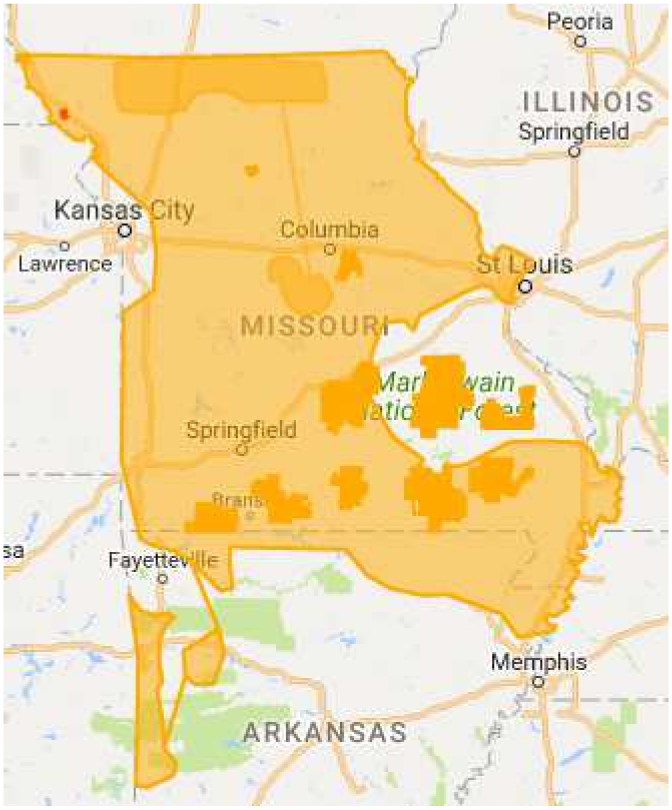
[13] Missouri Department of Conservation (2018) Field Guide: Bats https://nature.mdc.mo.gov/discover-nature/field-guide/bats
[14] Ibid.
[15] https://ac.els-cdn.com/S0960982208007513/1-s2.0-S0960982208007513-main.pdf?_tid=dc058694-0a37-11e8-adcf-00000aab0f26&acdnat=1517809746_dd8e8d93e2b840253f01b0d2ec88b0f7
[16] Baerwald, E.F. et al. (2008) Barotrauma is a significant cause of bat fatalities at wind turbines. *Current Biology* 18:16.

to that initiative, bald eagles were not present in Missouri. The eaglets ("baby eagles") were obtained from captive breeding facilities or healthy wild populations and released in nesting habitat at Mingo National Wildlife Refuge (close to Poplar Bluff, Missouri) and Schell-Osage Conservation Area (approximately 88 miles from Joplin) in Missouri. As a result of similar efforts done nationwide, the bald eagle was removed from the endangered species list on June 28, 2007, but still remains protected under the Migratory Bird Treaty and the Bald and Golden Eagle Protection Acts.[17] Table 1 includes a wind risk assessment and key habitat area map of bald eagles in Missouri according to the American Bird Conservancy.

[17] Missouri Department of Conservation (2016) Monitoring Bald Eagles in Missouri. https://mdc.mo.gov/conmag/2016-12/monitoring-bald-eagles-missouri

Table 1: Wind Risk Assessment Map and Key Habitat Areas of Bald Eagles in Missouri[18]



AMERICAN BIRD CONSERVANCY WWW.ABCBIRDS.ORG

KEY HABITAT AREA

Bald Eagle: Steve Hildebrand – USFWS

Global Population: 300,000

Trend: Increasing

Threats: Bald Eagles are hunters and scavengers that are closely associated with wetlands and tend to congregate in large numbers at key sites, especially outside the nesting season. They feed mostly on fish and carrion but will opportunistically capture birds and other prey. They are less dependent on aerial hunting than Golden Eagles and so may generally be less prone to wind turbine collisions. However, during their display season they engage in elaborate aerial courtship rituals that may leave them oblivious to spinning turbine blades. The display season varies with region but is typically very late or early in the year—much earlier than the nesting period of most other birds.

Conservation Issues: A huge and successful effort has been made to restore the Bald Eagle population in the lower 48 states. The species is the National Bird of the U.S. It was delisted from protection under the Endangered Species Act on August 8, 2007.

Actions: Place turbines away from eagle nesting and winter concentration areas. Consider turbine shut-downs during the display season.

[18] American Bird Conservancy (2018) Wind Risk Assessment Map. https://abcbirds.org/program/wind-energy-and-birds/wind-risk-assessment-map/

Q. Are other birds at risk from wind generation?

A. Yes. Both birds (especially migratory songbirds)[19] and bat fatalities can increase significantly as a result of improperly sited wind farms. [20] As more wind generation is brought online this will no doubt become a greater public policy issue moving forward.

Q. Does OPC have any suggestions?

A. Robust pre-development site selection and possibly curtailment during high risk migratory periods are generally considered best practices but are not always adhered to. The former should be a requirement, the latter may be an inevitability. OPC recommends that utilities also contract with one or more independent pre and post-construction third-party consultant to monitor and verify mortality data for birds and bats from wind generation sites. Ideally, this data would be made understandable and available to the public to encourage full transparency. At a minimum, OPC suggests this data be made available to the Missouri Department of Conservation, the United States Fish and Wildlife Service, the Missouri Public Service Commission Staff and the Missouri Office of the Public Counsel.

As it stands, mortality data on birds and bats from wind turbines is difficult to obtain, often opaque or entirely absent for appropriate analysis.[21] Moving forward, OPC recommends that the site selections for wind farms adhere to conservation best practices, record and report mortality data, and provide annual reports to the Commission for review.

OPC believes that Missouri's bird and bat populations are an integral part of our State's ecosystem and their role in appropriate site selections as well as the full range of impacts over the course of the wind farms life cycle needs to be considered.[22]

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[19] National Wind Coordinating Collaborative (20120) Wind Turbine Interactions with Birds, Bats, and their Habitats. https://www1.eere.energy.gov/wind/pdfs/birds_and_bats_fact_sheet.pdf

[20] Slayton, M. (2016) Conservation department serves notice to wind farm. St. Joseph News-Press http://www.newspressnow.com/news/local_news/conservation-department-serves-notice-to-wind-farm/article_d0ef5b0b-3188-5158-8cc8-7074fc62430b.html

[21] Loss, S.R. et al. (2013) Estimates of bird collision mortality at wind facilities in the contiguous United States. Biological Conservation. https://www.fws.gov/migratorybirds/pdf/management/lossetal2013windfacilities.pdf

[22] Amos, A.M. (2016) Bat killings by wind energy turbines continues. *Scientific American*. https://www.scientificamerican.com/article/bat-killings-by-wind-energy-turbines-continue/

Q. Does this conclude your testimony?

A. Yes