Exhibit No.:	_____
Issue(s):	Solar + Storage
Witness/Type of Exhibit:	Marke/Rebuttal
Sponsoring Party:	Public Counsel
Case No.:	EA-2019-0371

REBUTTAL TESTIMONY

OF

GEOFF MARKE

Submitted on Behalf of
the Office of the Public Counsel

UNION ELECTRIC D/B/A AMEREN MISSOURI

CASE NO. EA-2019-0371

December 12, 2019

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and a Certificate of Convenience and Necessity Authorizing it to Construct Solar Generation Facility(ies)	)))))	File No. EA-2019-0371

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 rebuttal 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 12th day of December 2019.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

JERENE A. BUCKMAN
My Commission Expires
August 23, 2021
Cole County
Commission #13754037

Jerene A. Buckman
Notary Public

My commission expires August 23, 2021.

TABLE OF CONTENTS

REBUTTAL TESTIMONY

OF

GEOFF MARKE

UNION ELECTRIC COMPANY
d/b/a Ameren Missouri
CASE NO. EA-2019-0371

I. INTRODUCTION

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

A. Geoffrey Marke, PhD, Chief Economist, Office of the Public Counsel ("OPC"), 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, and water utility operations.

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

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

Q. What is the purpose of your rebuttal testimony?

A. I respond to Ameren Missouri's amended application for solar plus storage. More specifically, I respond to the direct testimony of Tom Byrne, the revised direct testimony of Kevin Anders, and the supplemental direct testimony of Rex Jenkins.

Q. What is Ameren Missouri requesting?

A. The Company is requesting Commission approval for four separate Certificates of Convenience and Necessity ("CCN") at three separate locations for "behind the meter" distribution-level investments which include:

- Green City: 10 MW of solar;
- Richwoods: 10 MW of solar; and

- Utica: 10 MW of solar and 2 MW of storage

The application is being framed as a cost-effective "non-wire alternative" ("NWA") to what would otherwise be a traditional wire investment.

Q. Are there other features of Ameren Missouri's application the Commission should be aware of?

Yes. Ameren Missouri has included 2.5 MW of storage at Green City and 4 MW of storage at Richwoods, but have taken the position that these battery units do not need a Commission approved CCN.[1,2]

Additionally, Ameren Missouri has taken the position that, because it has elected SB 564's PISA framework, it is required to spend "***no less than*** fourteen million dollars in utility-owned solar facilities in Missouri . . . between August 28, 2018 and December 31, 2023" (emphasis added) *and* the Commission cannot consider either the "need for the project" or the "economic feasibility of the project"[3] in determining whether to approve CCNs for the aforementioned utility-owned solar investments or any other utility-owned solar investment built before (at least) 2024.

Stated differently, Ameren Missouri is essentially claiming that SB 564 has given it a "blank check" when it comes to utility owned solar investments. In fact, under Ameren Missouri's

[1] It is not entirely clear what Ameren Missouri's position is as it relates to battery storage conditions and the need for a Commission approved CCN. OPC attempted to clarify this issue through discovery by positing several hypothetical examples and requesting that Ameren Missouri provide its position and rationale. Those examples submitted in OPC DR-2001 included:

A.) Pumped Hydroelectric Storage (if there is a certain size threshold or other consideration please indicate what and why)
B.) Battery Storage at the generation-level (if there is a certain size threshold or other consideration please indicate what and why)
C.) Aggregated "Virtual Powerplant" of Home Energy "Tesla Powerwall" (if there is a certain size threshold or other consideration please indicate what and why)
D.) Other instances or examples the Company is willing to opine on.

Despite Mr. Byrne providing a legal conclusion in his testimony, Ameren Missouri objected to the data request as it calls "for a legal conclusion rather than seeking existing facts, documents or information."

[2] Ameren Missouri is seeking a CCN for the Utica storage feature because the storage feature will be cited outside of its certificated service area.

[3] That is, the first two of the five Tartan Factors traditionally analyzed in CCN applications.

position, how much money is spent and/or whether or not the Company needs the generation to serve its native load has been rendered wholly irrelevant and cannot even be considered by the Commission.[4] However, based on my own review of SB 564, as well as the advice of counsel, I cannot say that I agree with Ameren Missouri's position. Therefore, my testimony will address the prudency, or rather lack thereof, of Ameren Missouri's proposed solar plus storage.

Q. What are your recommendations?

A. I recommend that the application be rejected in its entirety. The proposed solar plus storage would be an imprudent waste of money that does not meet the Tartan Factors under current conditions and in its present design.

I will not respond directly to the legal opinions stated in Tom Byrne's testimony, as these do not represent factual claims being made by an expert but rather legal claims that are best left to briefing. Instead, my testimony will provide the Commission with the necessary facts and reasoning to understand why the Company's premise is flawed and should be rejected.

The rest of my testimony will provide the rationale for my recommendations and will be separated into three interrelated sections that are titled as follows:

1.) Response to the Application
2.) Outstanding Concerns and Recommendations Moving Forward
3.) Battery CCNs and Blank-Check Solar Investments

The fact that I do not address a particular issue in my testimony should not be interpreted as a tacit approval of a position proposed by the Company.

[4] That being said, Ameren Missouri's testimony does go to some effort to argue that their proposals are more cost-effective than the more traditional "wired" investments.

II. RESPONSE TO THE APPLICATION

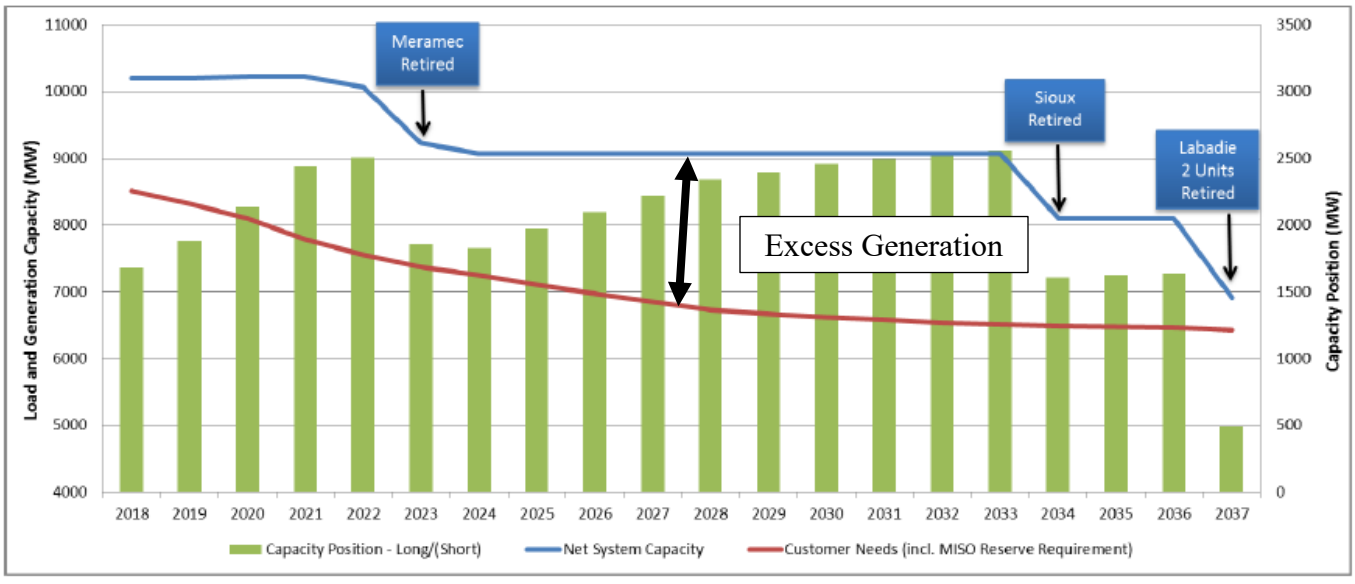
Q. Does Ameren Missouri need to build an additional 30 MW of solar and/or add 8.5MW of battery storage to meet its load requirements, reserve requirements, or Renewable Energy Standard ("RES") requirements?

A. No. The Company has absolutely no need to build-out its rate base with yet more generation for any of these reasons.

Q. What is Ameren Missouri's net capacity position?

A. It is long. According to the aforementioned 2017 Ameren Missouri triennial IRP, Ameren Missouri has no need for new resources in its planning horizon. This can be seen by looking at the delta between customer needs (including MISO reserve requirement) represented by the lower red line with the Company's net capacity position represented by the higher blue line in Figure 1.

Figure 1: Net Capacity Position—No New Resources (Baseline)[5]



[5] EO-2018-0038 Chapter 9. Integrated Resource Plan and Risk Analysis. p. 3.

Q. Is there anything about that graph the Commission should be aware of?

A. Yes. The Commission should be aware that the delta between the lines will be even more pronounced in the near future because the graph does not include the 700 MW of wind that the Company is planning and/or in the process of building presently. Nor does it account for the "up to 250 MW" of generation associated with Ameren Missouri's Green Tariff or the 1 MW Community Solar program.

Q. If Ameren Missouri does not need to build an additional 30 MW of solar and/or add 8.5MW of battery storage to meet its load requirements, reserve requirements, or RES requirements, then why is it proposing to build the solar + storage?

A. According to the application, Ameren Missouri is requesting to build intermittent generation and backup storage to meet what it perceives as reliability concerns on its distribution system.

Q. What problem is Ameren Missouri's application trying to solve?

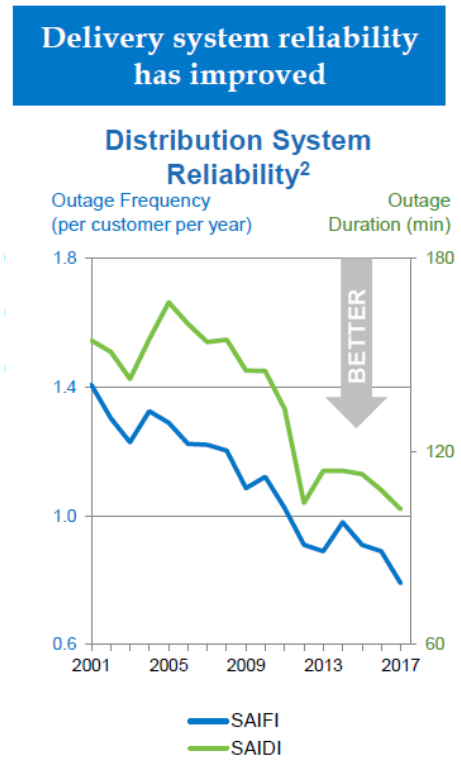
A. First off, I would argue that **there is no real problem** and that the Company is only engaging in this activity in order to build its rate base. But, putting aside that for a moment, the perceived problem that Ameren Missouri is claiming stems from the fact that each of the three sites selected (Green City, Richwoods, and Utica) are served on a radial line, that is, a distribution line extending out from only one power source. If that radial line goes down for some reason (*e.g.*, a storm knocks a pole down), the customers being serviced through that line would lose power until it was repaired (unless they had on-site backup generators). The Company is thus proposing to use the solar plus storage investment as a means to provide backup power for a limited time (and perhaps longer than 24 hours assuming sunny weather conditions and low usage) so that service would be uninterrupted for these select few customers until an Ameren Missouri linemen could repair the radial line.

Q. What do you mean when you say that there is no real problem?

A. No electrical distribution system is perfect and there will always be a chance for outages to occur. This fact, in and of itself, is not a problem. Instead, a problem occurs when a utility fails to take **reasonable** means to mitigate the risks posed by the reliability of its system. But

Ameren Missouri already has an extremely reliable system as measured by its System Average Interruption Frequency Index (SAIFI), which measures total number of interruptions per customer served, and System Average Interruption Duration Index (SAIDI), which measures the average outage duration for each customer served, shown in figure 2.

Figure 2: Net Capacity Position—No New Resources (Baseline)[6]



Further, when considering the specific nature of this application, it quickly becomes clear that Ameren Missouri's proposal is simply unreasonable in terms of the benefit provided versus the costs that will be incurred. This is the result of many different facts including the overall estimated cost of the project, the historical frequency and scale of the service disruptions that have occurred, and the number of people who will be actually affected. When all of these

[6] Edison Electric Institute Financial Conference. Ameren Presentation, November 12-13, 2018. https://www.stockline.net/wp-content/uploads/2018/12/Ameren.pdf

factors are considered together, it quickly becomes clear that the Company is proposing to spend a great deal of money to achieve a very *de minimis* benefit to a very small number of customers. This is patently unreasonable.

To understand why Ameren Missouri's proposal is unreasonable, one needs to understand the economics behind the proposal in the context of the Company's current distribution system.

Q. Please describe Ameren Missouri's existing distribution system.

A. According to Ameren Missouri's 2017 Triennial IRP in Case No: EO-2018-0038 (Chapter 7), Ameren Missouri's distribution system is:

- 33,000 miles long serving 63 counties and more than 500 communities;
- Serves approximately 1.2 million customers through distribution system power lines that operate at voltage levels ranging from 2,400 volts ("V") through 69,000 V.
- Has historically worked well at providing service under peak conditions;
- 22% of the 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;
- Most of the distribution system in rural areas are supplied via single substations operating in radial configurations—from one power source; and
- A portion of the distribution system is networked—more than one power source, and thus less susceptible to a total power loss. [7]

Q. How do these factors matter in the context of Ameren Missouri's application?

A. There are a number of important things to take away from this, but three stand out in particular. The first is the fact that Ameren Missouri itself recognizes its distribution system has "historically worked well at providing service under peak conditions" which just further underlines the point I made earlier about how the Company already has a resilient distribution system. Second, and perhaps more important, most of Ameren Missouri's distribution system is in rural areas and is operating via radial line configuration. This, of course, means that the

[7] EO-2018-0038 Chapter 7. Transmission and Distribution. p. 17-19.

"problem" that Ameren Missouri is attempting to convince the Commission actually exists is not an isolated one. When combined with the third point that Ameren Missouri's distribution system is "33,000 miles long serving 63 counties and more than 500 communities," it quickly becomes apparent that the Company's so-called "problem" is potentially quite wide-spread. However, this just raises new questions, such as why Ameren Missouri has chosen to prioritize these three locations to build solar plus storage.

Q. How has Ameren Missouri historically prioritized capital projects on its distribution system?

A. Again, per Ameren Missouri's 2017 IRP:

> Capital projects are considered to be mandatory if they are required by PSC or government regulations, result from court cases, are necessary to meet minimum obligations to serve, or address imminent public or employee safety concerns. Funding priorities for projects which are not mandatory are based on cost/benefit and risk assessments. **Key to this evaluation is a reliability based prioritization metric called the Service Availability Cost Factor (SACF)** - a calculated index that facilitates ranking projects on a common cost/benefit basis. In its simplest form, SACF represents the cost per unit risk where risk is measured as customer load in kVA multiplied by hours of outage. By giving preference to projects with the best cost/benefit ratios (lowest SACF scores), Ameren Missouri ensures that system capacity and reliability will be enhanced as fully as possible through proper prioritization of capital investments.[8]

Q. Did Ameren Missouri perform a SACF evaluation for these projects?

A. No. Ameren Missouri is no longer utilizing the SACF metric so it did not perform a SACF review for these projects. Based on Ameren Missouri's response to Staff DR 0055 it does not appear as though *any* reliability based prioritization metric was utilized. The Staff DR 0055 question and Ameren Missouri's subsequent response is as follows:

[8] Ibid. p. 22.

MPSC DR 0055:

(1) Provide the Service Availability Cost Factor (SACF) for each of the three projects include supporting calculations and assumptions.

(2) Provide the Service Availability Cost Factor (SACF) for any traditional alternatives considered include supporting calculations and assumptions.

Ameren Missouri Response:

Ameren Missouri is no longer using the SACF method to justify projects. A new methodology is being finalized to evaluate projects. This approach has both objective criteria and uses Ameren Missouri engineer's professional expertise to prioritize investments annually.[9]

Q. Given that there was no SACF evaluation for these projects, how did Ameren Missouri choose the selection of these three specific sites?

A. Given the limited forced outage history (to be discussed in greater detail later) of these three circuits, it appears as though the three sites were selected somewhat arbitrarily. I say somewhat, because, for this proposal to work, there needed to be available land nearby to place the solar to justify it. It just so happens that Ameren Missouri could purchase land that was near to the three locations that it choose. However, I am unable to verify the degree to which this "coincidence" effected Ameren's decision regarding these three sites.

Q. You mentioned previously that Ameren Missouri is no longer using a cost benefit methodology of its capital investments on its distribution system. Does this concern you?

A. Yes. In fact, to say that it concerns me would be a significant understatement. This is especially true considering Ameren Missouri's election of PISA accounting which (among other things) is prioritizing "400 miles of new cable underground"[10] " and billions of dollars in other similar costly investments that necessitate an *increased* scrutiny on reliable cost-benefit analyses, not

[9] MPSC DR-0055 See also GM-2.
[10] Gray, B. (2019) Rising heat and climate extremes mean questions, challenges for roads, power grid and other infrastructure. *St. Louis Post Dispatch* (Nov. 13) https://www.stltoday.com/business/rising-heat-and-climate-extremes-mean-questions-challenges-for-roads/article_261cd421-97a3-5cdc-8ad7-503c2c9dd455.html

a movement away from thorough scrutiny and analysis as Ameren has done in the present proposal.

Q. How do utilities and regulators traditionally value reliability?

A. One common framework is to perform a Value of Lost Load ("VOLL") study.

Q. What is a VOLL study?

A. The value of lost load is the average amount consumers are willing to pay to avoid an additional period without power. However, there are many variations depending on the scale, scope and degree of accuracy one hopes to achieve. According to an oft-cited Electric Reliability Council of Texas, Inc. ("ERCOT") literature review and macroeconomic analysis report conducted by London Economics International LLC:

> VOLL is a useful and important measure in electricity markets. It represents customers' willingness to pay for electricity service (or avoid curtailment). In electricity markets, VOLL is usually measured in dollars per MWh. VOLL valuations can be marginal – the marginal value of the next unit of unserved power – or average – the average value of the unserved power. Marginal values of VOLL are often calculated for peak periods (or "worst case") when customers will place the highest value on electricity. Average VOLLs are averaged over a certain period (e.g., one year) and are not differentiated over time. Average VOLLs tend to be lower than marginal VOLLs at peak times, as they average out the value customers place on electricity over, say a year, and therefore include periods during which customers place a low value on electricity (i.e., when customers are not at home or when businesses are closed) . . .
>
> VOLL can be used in a variety of ways, both on the planning side of the market and on the operations side. In planning, VOLL can be used to study the cost-

benefit of investment in generation and transmission and distribution relative to customers' maximum willingness to pay, as briefly discussed above.[11]

There are four VOLL estimation methodologies cited by the ERCOT study, each with various strengths and weaknesses. A summary of those methodologies is included in Figure 3 below.

Figure 3: VOLL Estimation Methodologies [12]

Approach	Description	Strength	Weakness
Revealed preference (market behavior)	Use of surveys to determine expenditures customers incur to ensure reliable generation (i.e., back-up generators and interruptible contracts) to estimate VOLL	▪Uses actual customer data that is generally reliable	▪Only relevant if customers actually invest in back-up generation ▪Limited consideration of duration and/or timing of outages ▪Difficult for residential customers to quantify expenses
Stated choice (contingent valuation and conjoint analysis)	Use of surveys and interviews to infer a customer's willingness-to-pay, willingness-to-accept and trade-off preferences	▪More directly incorporates customer preferences ▪Includes some indirect costs ▪Considers duration and/or timing of outages	▪Experiment and survey design is time-consuming and effort intensive ▪Need to manage for potential biases ▪Residential customers may give unreliable answers due to lack of experience
Macroeconomic (production function)	Uses macroeconomic data and other observable expenditures to estimate VOLL (e.g. GDP/electric consumption)	▪Few variables ▪Easy to obtain data ▪GDP reasonable proxy for business VOLL	▪Does not consider linkages between sectors, productive activities ▪Proxies for cost of residential outages may be arbitrary or bias
Case Study	Examines actual outages to determine VOLL	▪Uses actual, generally reliable data	▪Costly to gather data ▪Available case studies may not be representative of other outages/jurisdictions

[11] London Economics (2013) Estimating the Value of Lost Load. http://www.ercot.com/content/gridinfo/resource/2014/mktanalysis/ERCOT_ValueofLostLoad_LiteratureReviewandMacroeconomic.pdf p. 6.
[12] Ibid. p. 9

Q. Did Ameren Missouri perform a VOLL study for this project?

A. Not that I am aware of.

Q, Did Ameren Missouri perform any type of cost-benefit analysis at all?

A. Ameren Missouri did compare the cost of adding an additional wired line against the cost of solar plus the cost of the batteries less an assumed cost savings from the decreased system load caused by the solar investments.

Q. There is a lot to unpack there. Let's start with the "assumed cost savings from the decreased system load." what does that mean?

A. The direct benefit that customers can expect to see from Ameren Missouri's proposal are the distribution benefits related to reliability in the form of backup power from the solar and battery assets. There will also, however, be a secondary benefit to customers that comes in the form of decreased system load from the solar generation "behind the meter." This secondary benefit acts as revenue offsets to the costs of the project in Ameren Missouri's proposal.

Q. You say that the decreased system load caused by the solar generation acts as revenue offsets to the costs of the project. Does that mean that this project will pay for itself?

A. No. Even accounting for the revue offset created by selling the additional energy generated by the solar generation, Ameren Missouri's proposal does not even come close to paying for itself. In addition, it is important to note that solar, by itself, is not a substitute for traditional distribution investment to meet reliability needs because solar is a form of intermittent generation. That means there is no guarantee that the solar will be available to provide energy when it's actually needed to avoid an outage. Moreover, as stated earlier, there is no need for additional capacity or renewable credits, nor would solar be the least cost resource if there was a need for additional capacity or renewable credits.

Q. Going back to the statement about what cost-benefit Ameren Missouri did manage to do, can you please summarize the relevant metrics provided in Ameren Missouri's proposal?

A. Yes. Table 1 provides a summary of Ameren Missouri witness Kevin Anders revised direct testimony regarding the three sites including: the number of customer directly impacted, the

number of outages that have occurred over the past three years, the longest outage over the past three years, an eight-year annual forced outage rate and the cost estimates for both the wire and non-wire options.

Table 1: Key cost and reliability metrics regarding the selected sites

Site	# of Customers on circuit	# of Outages 2016-18	Longest Outage 2016-18	Forced Outage Rate 2011-2018[13]	Wire estimate	Non-Wire estimate
Green City	580	5	4hrs 18m	4 out of 8,760 hours per year	$21m	$22.7m
Richwoods	615	6	4hrs 12m	9.2 out of 8,760 hours per year	$6.1m	$24.6m
Utica	515	9	5hrs 14m	7.1 out of 8,760 hours per year	$13m	$21.7m
Total	1,710	20			$40.1m	$69m

Q. Based on this table, the non-wired alternative is more expensive than the wired option. How is Ameren Missouri claiming that the non-wired alternative is cost-effective?

A. As previous stated, Ameren Missouri has included the monetary benefits of a decreased system load from the solar investment as an offset to the costs. However, I do not agree with the methodology employed by the Company in determining these offsets and so have not included them in this table.

Q. What about using just batteries to meet reliability needs. Has that been considered?

A. The use of just batteries could be an alternative to a traditional distribution investment to meet reliability needs. In other words, Ameren Missouri could just place a battery at each of the three sites which could then provide backup power when there are forced outages. Further, while this solution would not be a cost effective option itself, it would still be far cheaper than the proposed solar plus storage option. In addition, the batteries that Ameren Missouri is intending to introduce carry enough energy to meet peak load use for four hours at each of the

[13] See also GM-3 for MPSC ("Missouri Public Service Commission") Staff data request 0063.

three sites. This means that the battery only option would have been capable of reducing the longest outage suffered by Green City, Richwoods, and Utica to 18 minutes, 12 minutes and 74 minutes, respectively. And that is assuming that all outages occurred during periods of peak load.

Q. That brings up another good question. Just how many people can be expected to benefit from this proposal?

A. There are only 1,710 customers directly serviced on these three circuits. These lucky few will get a very expensive, clean, mostly reliable, redundant power source that will be subsidized in large part by the rest of the 1.2 million customers paying for Ameren Missouri's cost of service.

Q. Does OPC have any concerns that only a small subset of the customers are largely benefitting from this proposal?

A. Yes, on its face, it is not very equitable nor does it follow the cost-causative principles put forward under the principles of sound regulation. In effect, Ameren Missouri's proposal creates a heavily subsidized gated community in terms of increased electric reliability. This by itself, raises concerns moving forward.

Q. Can you please elaborate on that?

A. Certainly. As previously indicated, there are actually a large number of communities being served by these types of radial lines. It is not difficult to imagine a situation where potentially very affluent suburban communities see similar solar plus storage investments aimed at improving reliability while simultaneously shifting costs onto lower income urban areas where such solar investments would be infeasible due to land constraints.

Q. What would be the monetary costs of this proposal if it was borne solely by the customers directly benefiting from the increased reliability; that is, if it was cost-causative?

A. Table 2 isolates those sites and looks at the cost per customer as well as the median annual income reported for those same customers.

Table 2: Cost per customer for Ameren Missouri's non-wire solution

Site	# of Customers on circuit	Non-Wire estimate	Cost per customer	Median Annual Income[14]
Green City	580	$22.7m	$39,138	$31,406
Richwoods	615	$24.6m	$40,000	$37,810[15]
Utica	515	$21.7m	$42,136	$34,271
Total or average of all 3	1,710	$69m	$40,351	$34,495[16]

Q. Do some customers value reliability more than others?

A. Yes. Certain critical customers clearly value reliability more. Examples would include first responders and hospitals.

Q. How many first-responders or otherwise "critical" customers are being served on the each of the three radial lines in the application?

A. I posed that question to Ameren Missouri and was told that the Company had identified 24 customer accounts as "critical." OPC made an attempt to contact each of those accounts by phone to verify whether or not the critical customer had backup, standby generators on-site in the event of a forced outage. Based on the feedback we were given, OPC concluded that:

- 14 of the 24 identified critical customers already have invested in on-site generators;
- 7 school accounts were misidentified as critical customers;
- 1 nursing home had portable oxygen on hand and contingency plan for more than 48 hours
- 1 voluntary fire house only uses the building as a storage for equipment; and

[14] Incomes based on 2013-2017 American Community Survey data and included in an Ameren Missouri response to OPC DR-2010 and included in GM-4. Richwoods is unincorporated and therefore does not have a specific community income level.
[15] Richwoods is unincorporated and therefore does not have a specific community income level. The cost estimate is based on Washington County Missouri median income level, see also: https://datausa.io/profile/geo/washington-county-mo/
[16] The $34,495 figures is the mean of the three median annual incomes.

- 1 voluntary fire house did not answer

It is not entirely clear if there are any "critical" customers that need additional back-up generation, but of the customers identified by Ameren Missouri as critical, my research shows these customers do not need this project..

Q. What other metrics could the Commission consider in appropriately valuing lost load?

A. There is a large private market for customers who value reliability in the form of on-site generators.

Q. How much does a backup generator for a home cost?

A. I googled "best rated backup generator" and was directed to a website titled GeneratorMag.com and to a page titled "Best Whole House Generator Reviews 2019." Figure 4 includes a snippet of the "best" home generators of 2019 according to the website GeneratorMag.com.

Figure 4: Best Whole House Generator Reviews 2019 (last updated November 27th, 2019 at 11:30pm)[17]

The five-star Champion Power Equipment 100294 Home Standby Generator is currently priced at $4,199.00 +$99.00 shipping on Amazon. Features listed include:

- **Whole house 24/7 power** - the Ats200 whole house transfer switch with demand control Provides seamless, managed power to your entire home during an outage
- **Quietest-in-class** - thanks to advanced sound dampening and a specially designed low-tone muffler, This generator operates at a residential-friendly 63 dba noise level

[17] Generatormag.com (2019) Best whole house generator reviews 2019. https://www.generatormag.com/best-whole-house-generator-reviews/

- **Reliable** - 24-volt starting system operates in sub-zero or extreme heat (between -22 Degree F and 104 Degree F) with no warming kit necessary, plus the generator performs weekly self-diagnostic tests
- **Powerful** - the 14-kilowatt generator provides 14, 000 watts of continuous power on propane and 12, 500 watts on natural gas, with no refueling, no manual operation and no Extension cords needed
- **Champion support** - includes 10-year limited with free lifetime technical support from dedicated experts[18]

If each of the 1,710 customers were instead given a five-star Champion Power Equipment 100294 Home Standby Generator it would cost a total of $7,353,000. Which would be $61,647,000 less than Ameren Missouri's proposal.

To be clear, I am not advocating for this. The example is merely illustrative to show that there is a private market in place for this niche service that is much more economically efficient than what is being contemplated.

Q. Would you recommend the wired option?

A. No. My recommendation would be to do nothing based on what has been filed. There is nothing on the record from the Company that suggests a large capital investment (wired or non-wired) is justified to account for approximate 6 hours of forced outages a year across these three radial lines. In fact, there are 209 single supply substations on Ameren Missouri's distribution system that have to date, provided adequate, safe, and reliable service without the categorical modifications discussed in this application.

Q. Can you summarize your concerns from this section?

A. Yes. A non-exhaustive list of concerns referenced above include:

- There is no need for the generation;

[18] Amazon.com (2019) Champion Power Equipment 100294 Home Standby Generator https://www.amazon.com/Champion-Power-Equipment-100294-Generator/dp/B01MYN8Y7Y/?creativeASIN=B01MYN8Y7Y&linkCode=w61&imprToken=FUms3wOZqalbI3VkPgMlzg&slotNum=0&tag=gensetmag-20 12/11/2019.

- The costs do not justify the espoused benefits;
- There are alternative options that are more economically efficient;
- The application is not in-synch with the Company's IRP;
- The Company has abandoned its Service Availability Cost Factor Methodology and replaced it with nothing;
- There was no Value of Lost Load Study conducted;
- There are no critical customers who don't already have back-up generation on these lines;
- The proposal largely abandons the principles of cost-causation and encourages islanding of gated communities; and
- The Company incorrectly assumes there are only two options to address this perceived problem.

III. OUTSTANDING CONCERNS MOVING FORWARD ON NWA PROJECTS

Expedited Schedules

Q. Do you have any concerns with the speed and timing of this docket?

A. Yes. The timing and speed of this case has prevented meaningful engagement from OPC. The testimony that was filed was incomplete or incorrect as evidence by the November 25th filing to the Commission that acknowledged that Ameren Missouri's Utica site is not actually in its certificated area. Moreover, as stated earlier, based on my analysis of the application it appears as though minimal work was done to ensure the cost effectiveness of these projects.

I bring these concerns up with the full acknowledgment that OPC agreed to this expedited schedule in the middle of Ameren Missouri's rate case. My hope is that Ameren Missouri is more conscious of stakeholders' and the Commission's time in the future.

Environmental Concerns

Q. Do you have any environmental concerns with these projects?

A. I have concerns insofar as ensuring all reasonable costs are not captured in the application. If there are potential environmental liabilities or understated decommissioning costs than the benefits will be overstated and the hoped-for outcome will be distorted. For example, I had concerns regarding the potential leakage of poly-and perfluoroalkyl ("PFAS", "forever chemicals" or "GenX compounds) commonly found in products like Teflon and included in many solar panels into the ground of the site locations. This issue was recently raised in Fayetteville, North Carolina with a pending Duke Energy Solar project.[19] My understanding of the issue based on discussions with a representative from the EPA is that these chemicals are typically found in Chinese solar panels. That being said, based on responses in discovery Ameren Missouri has confirmed that their contracted solar panels do not contain such chemicals. I will need to conduct further discovery with Ameren Missouri on cadmium, lead and other substances that can pose similar threats as raised by other experts.[20]

Finally, I have concerns about future cost increases associated with decommissioning utility-scale projects. I would note that North Carolina recently passed a law requiring its Environmental Management Commission to adopt rules to establish a regulatory program to govern the management of end-of-life photovoltaic modules and energy storage system batteries and the decommissioning of utility-scale solar projects and wind energy facilities.[21]

I do not believe it is in the public interest to omit these concerns or delay having a constructive dialogue about how to deal with the end-of-life of these assets. I have no specific

[22] Sowell, T. (2007) *Economic Facts and Fallacies*. Basic Books. (https://www.miamiseniorhigh.org/ourpages/auto/2016/6/3/66923376/Sowell%20Thomas%20%20Economic%20Facts%20and%20Fallacies.pdf p. vii.
[22] Sowell, T. (2007) *Economic Facts and Fallacies*. Basic Books. (https://www.miamiseniorhigh.org/ourpages/auto/2016/6/3/66923376/Sowell%20Thomas%20%20Economic%20Facts%20and%20Fallacies.pdf p. vii.
[22] Sowell, T. (2007) *Economic Facts and Fallacies*. Basic Books. (https://www.miamiseniorhigh.org/ourpages/auto/2016/6/3/66923376/Sowell%20Thomas%20%20Economic%20Facts%20and%20Fallacies.pdf p. vii.

recommendations on this topic at the moment, but would welcome feedback from the rest of the stakeholders to this case.

Opportunity Costs

Q. Does the fact that the proposal includes solar and storage in a novel manner (on the distribution system) ultimately outweigh all of the concerns you raised earlier?

A No. I do not believe the public interest is being served in an environment where any proposal can be approved as long as it is labeled "green" or referenced in the latest issue of *Public Utilities Fortnightly*. To quote economist Thomas Sowell:

> Some things are believed because they are demonstrably true. But many other things are believed because they are consistent with a widely held vision of the world—and this vision is accepted as a substitute for facts. Subjecting beliefs to the test of hard facts is especially important when it comes to economic beliefs because economic realities are inescapable limitations on millions of people's live, so that polices based on fallacies can be devastating in their impacts. Conversely, seeing through those fallacies can open up many unsuspected opportunities for a better life for millions of people.[22]

Saying yes to everything that the Company wants to do regardless of whether it is needed will add up to more than we can afford. That is the economic reality of scarcity and is predicated on the concept of opportunity costs that recognizes there are always tradeoffs in the decisions we make.

Q. What is the concept of opportunity cost?

A. Opportunity cost is the benefit that is missed or given up when one alternative is chosen. It's a tradeoff that is commonly expressed as the relationship between scarcity and choice. We have infinite wants and finite means.

[22] Sowell, T. (2007) *Economic Facts and Fallacies*. Basic Books. (https://www.miamiseniorhigh.org/ourpages/auto/2016/6/3/66923376/Sowell%20Thomas%20%20Economic%20Facts%20and%20Fallacies.pdf p. vii.

Q. Why is the concept of opportunity cost relevant to this proposal?

A. In multiple dockets now, I have expressed my anxiety and concern at the large expected cost estimates projected by Ameren Missouri for it's Smart Energy Plan (over $5 billion), Ameren Missouri Wind (over $1 billion), Ameren Missouri MEEIA Cycle II (over $300 million) potential remedial environmental costs for Rush Island and Labadie (estimated between $4 and $6.8 billion) and other isolated expected cost expenditures (the hundreds of millions in AMI costs not included in the Smart Energy Plan, cost related to Coal Ash Residual Rules, etc.).

If even half of these costs materialize it will have a profound impact on Ameren Missouri's customers. The problem with the solar + storage proposal (beyond those expressed above) is that it is divorced from the reality of these other pending costs. In a regulatory vacuum one might be able to justify a novel but cost ineffective project on the basis of some normative "public interest" but captive ratepayers are not living in a regulatory vacuum. They are going to shoulder these costs.

Put bluntly, Ameren Missouri's ratepayers do not have the luxury to shoulder unnecessary costs in light of the billions in expected near-term costs coming from other projects that they will also be asked to pay for.

Future Non-Wire Alternative Filings

Q. Are you forever against a solar + storage option?

A. Absolutely not. I am against spending money ratepayers don't have for projects they don't need. To be clear, I filed comments in Ameren Missouri's Special Contemporary Topics docket in mid-September specifically requesting that the Commission order Ameren Missouri (and other utilities) to investigate the concept of virtual power plants in its IRP process. That is, utilities should specifically be exploring the feasibility of NWA's to meet our future resource needs through the IRP process. That is, in part, what is missing in this proposal—the empirical support of the IRP process. Unfortunately my suggestion to include virtual power plants was dismissed.

Q. On a scale of 1 to 10 with 1 being no confidence and 10 being absolute confidence, how confident are you that this filing is not in the public interest, that is, ratepayers would be better off without it than with it?

A. I would say an 8.5.

Q. What would it take to get you to a 5?

A. The Company would need to show how this project makes sense within the context of its IRP and other projects. The uncertainty surrounding Rush Island and Labadie makes it difficult for me to commit to just building out more excess generation that we don't need at cost prohibitive levels. The Company would need to engage stakeholders earlier in the process. An inordinate amount of time has been wasted focusing on the legal ramifications of whether or not a CCN is required for a battery or if SB 564 enables Ameren Missouri to spend whatever, whenever they want on solar for the next three years. These discussions have come at the expense of the merits of this specific proposal. The Company would also need to show some empirical support in the form of an agreed-to VOLL study that ranked all reasonable economically efficient options. Additionally, I would want the Company to attempt to factor in the continued projected drop in prices for both solar + storage. This project may be much more economically attractive two years into the future.[23] Providing this level of support to substantiate their proposal would be a strong first-step towards meeting the Tartan Factors traditionally used to meet approval for a CCN.

[23] For example, the CEO of the Energy Storage Association, Kelly Speakes-Backman estimates the unit cost of electricity produced from solar-plus-storage system will drop 10 to 15 percent each year through 2024. See https://www.wired.com/story/cheap-at-last-batteries-are-making-a-solar-dream-come-true/

IV. BATTERY CCNs AND BLANK-CHECK SOLAR INVESTMENTS

Q. Ameren Missouri argues that the Company does not need a Commission-approved CCN for storage. What facts should the Commission be cognizant about?

A. FERC 841 was explicitly designed to remove barriers to the participation of electric storage resources in the capacity, energy and ancillary service markets operated by the RTOs. Clearly storage will play an increasing role in the markets and will impact future "traditional" generation resource plans.

I would also point out that, in theory, many singular storage facilities could also virtually be aggregated to function as resources when bidding into the market. Ameren Missouri's stated purpose in this case is to only use the storage for forced outages (approximately 6 hours or less a year) but if the Commission were to agree with the Company's application as filed, then Ameren Missouri could theoretically have many individual storage systems that could function as a large resource. That is, dismissing the singular, small scale could have the unintended consequence of creating a "work around" the CCN process.

Q. Ameren Missouri argues that SB 564 nullifies the Commission's ability to consider cost and need for utility-owned, ratepayer-funded solar investments. What facts should the Commission be cognizant about on this issue?

A. Economic regulation seeks to replicate the outcomes of effective competition. As such, investors seek the highest reasonable returns for the equivalent amount of risk. If there is no risk (*e.g.,* both need and costs cannot be considered) there should be no reasonable expectation for a return on the investment. Ratepayers should not be expected to reward investors when no risk is present.

Q. Does this conclude your testimony?

A. Yes.

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)	EA-2019-0371	**Rebuttal:** Non-wires Alternatives, Solar + Battery
Union Electric Company d/b/a Ameren Missouri	OPC	ER-2019-0335	**Direct:** Keeping Current Bill Assistance Program
Rule Making	OPC	AW-2020-0148	**Memorandum:** Residential Customer Disconnections and Data Standardization
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)
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"
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-2016-0156	**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
Union Electric Company d/b/a Ameren Missouri	OPC	EO-2015-0029	Ameren MEEIA Cycle I Prudence Review 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

Ameren Missouri's
Response to MPSC Data Request - MPSC
EA-2019-0371
Application for CCN - Solar Plus Storage

No.: MPSC 0055

(1) Provide the Service Availability Cost Factor (SACF) for each of the three projects include supporting calculations and assumptions. (2) Provide the Service Availability Cost Factor (SACF) for any traditional alternatives considered include supporting calculations and assumptions. Data Request submitted by Claire Eubanks (Claire.Eubanks@psc.mo.gov).

RESPONSE

Prepared By: Jonathan M. Schmidt
Title: Supervising Engineer Distribution System Planning
Date: 11/04/2019

Ameren Missouri is no longer using the SACF method to justify projects. A new methodology is being finalized to evaluate projects. This approach has both objective criteria and uses Ameren Missouri engineer's professional expertise to prioritize investments annually.

Ameren Missouri's
Response to MPSC Data Request - MPSC
EA-2019-0371
Application for CCN - Solar Plus Storage

No.: MPSC 0063

Provide the average forced outage rate (hrs/year) for the circuits. Data Request submitted by Claire Eubanks (claire.Eubanks@psc.mo.gov).

RESPONSE

Prepared By: John Siracusa
Title: Manager Capital Planning & Analysis, ED Ops Support
Date: 11/20/19

Please see below for the forced outage rates (unplanned outage hours/year) for RAIL-72, ESTR-73 and GARD-74 for years 2011-2018 and 2019 YTD October.

ESTR-73: 4 hours per year
Rail-72: 9.2 hours per year
GARD-74: 7.14 hours per year

Ameren Missouri's
Response to OPC Data Request
EA-2019-0371
Application for CCN - Solar Plus Storage

Data Request No.: OPC 2010

2010. How is Ameren Missouri addressing issues of equity and low to moderate income customers (if at all) in its existing, proposed, and/or anticipated solar projects as was an expressed priority from the Commission in the rulemaking docket EX-2019-0050?

RESPONSE

Prepared By: Greg Lovett
Title: Manager Energy Services
Date: 10/31/2019

Low to moderate income customers are benefiting from existing and proposed solar projects in the following ways:

1. The proposed Solar + Storage facilities will be located in the communities of Green City, Richwoods and Utica where a large percentage of customers have low to moderate incomes. According to the 2013-2017 American Community Survey, the median incomes for Green City and Utica are $31,406, and $34,271, which for a household of 4 is 122% and 133% of the federal poverty rate. Richwoods is unincorporated and does not have specific income level data. Ameren Missouri is planning to bring increased reliability to customers in these communities. During sunny days, customers in this area will receive their energy primarily from the solar facility. The solar energy will also charge the battery. In the case of a service interruption, each battery will be able to power connected homes for several hours, giving Ameren Missouri repair crews time to fix the service issue without causing an extended outage.
2. As part of the Neighborhood Solar program made possible by a law, SB564, passed by the Missouri General Assembly in 2018, Ameren Missouri will install at least $14M of solar generation facilities in parking lots, on roofs and in available open spaces across the state. Further, job training and education are site evaluation criteria for Neighborhood Solar.
3. Rider SR, Solar Rebate, is to provide incentives up to $28M over the five (5) calendar years 2019-2023 to customers who install customer-owned solar installations. Of this amount, $800,000 of solar rebate funding has been reserved over the five (5) year period to only be available for use by low income customers.