

Exhibit No. 200

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Sponsoring Party:	Public Counsel
Case No.:	EA-2022-0245

REBUTTAL TESTIMONY

OF

GEOFF MARKE

Submitted on Behalf of the Office of the Public Counsel

**UNION ELECTRIC COMPANY
D/B/A AMEREN MISSOURI**

FILE NO. EA-2022-0245

December 21, 2022

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REBUTTAL TESTIMONY
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d/b/a AMEREN MISSOURI
CASE NO. EA-2022-0245

1 **I. INTRODUCTION**

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

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

5 **Q. What are your qualifications and experience?**

6 A. I have been in my present position with OPC since 2014 where I am responsible for economic
7 analysis and policy research in electric, gas, water, and sewer utility operations.¹

8 **Q. What is the purpose of your rebuttal testimony?**

9 The purpose of my rebuttal testimony is to provide a response to Ameren Missouri’s
10 application for a Certificate of Convenience and Necessity (“CCN”) for Ameren Missouri’s
11 Boomtown Solar Farm as well as the associated Renewable Energy Solutions program. I also
12 provide recommendations on issues not addressed in Ameren Missouri’s solar generation
13 application including considerations related to maintaining appropriate conservation habitats;
14 storm water run-off management; the need to confirm that solar panel selections were not
15 sourced from Chinese forced Uyghur labor camps; and end-of-life management
16 considerations.

17 **Q. Do you recommend that the Commission grant Ameren Missouri a CCN for its**
18 **Boomtown solar farm?**

19 A. No. As presently drafted, I recommend that the Commission reject the proposed CCN
20 application unless and until more detail has been provided and my concerns have been
21 addressed. I am not opposed to taking advantage of the federal funding stream window that the

¹ See GM-1.

1 Inflation Reduction Act (“IRA”) has presented especially in light of the need for further
2 generation to meet future load, but want to ensure that ratepayers are not materially exposed to
3 future liabilities.

4 **Q. What is your recommendation to the Commission regarding Ameren Missouri’s**
5 **Renewable Solutions Program?**

6 A. A CCN docket is not an appropriate forum for the approval of a new tariffed customer program
7 and should be considered separate and aside from approval of Boomtown site selection.
8 Additionally, the Renewable Solutions Program omits an important risk mitigation measure
9 (the 50/50 sharing of shareholder/ratepayer risk) that has been in place for all Commission-
10 approved, customer-centric renewable choice programs to date. I recommend that Ameren
11 Missouri withdraw Mr. Steve D. Wills’ testimony in this case and file supplemental direct
12 testimony in its currently filed rate case (Case No. ER-2022-0337) as soon as possible to allow
13 interested parties an opportunity to respond in a docket where all relevant details can be
14 considered.² If Ameren Missouri fails to withdraw the testimony (and refile it as supplemental
15 direct in its rate case or another case) and/or fails to include a proper risk mitigation mechanism
16 for undersubscribed portions of the program, I recommend that the Commission reject the
17 program.

18 My silence regarding any issue should not be construed as an endorsement of, agreement
19 with, or consent to any party’s filed position.

20 **II. BOOMTOWN SOLAR FARM**

21 **Q. What does the Commission consider in a CCN proceeding?**

22 A. The Commission typically cites to factors it listed in a 1994 Commission order commonly
23 referred to as the Tartan Factors.³ They are as follows:

- 24 1. Is the service needed?

² Alternatively, if the Company wants to open a separate docket entirely on this issue, that would be acceptable.

³ *In the Matter of the Application of Tartan Energy Company, LLC, d/b/a Southern Missouri Gas Company*, 3 Mo P.S.C.3d 173, 177 (1994).

2. Is the applicant qualified to provide the service?
3. Does the applicant have the financial ability to provide the service?
4. Is the applicant's proposal economically feasible?
5. Does the service promote the public interest?

I will address each of these points in turn.

Q. Do you believe this solar farm (service) is needed?

A. Neither the 150 MW of proposed solar capacity nor the customer-optional renewable program are necessary for Ameren Missouri to provide safe and reliable service today. However, given the timing of planned power plant retirements, recent concerns over MISO North and Midwest capacity needs, uncertainty over the speed of future load growth, and the opportunity presented to offset costs with Production Tax Credit ("PTC") subsidies, the solar farm should provide a reasonable part of the offset for near-term future need.

Q. Is Ameren Missouri qualified to build, own, operate and maintain the solar farm?

A. Yes.

Q. Does Ameren Missouri have the financial ability to build, own, operate, and maintain the solar farm?

A. Yes.

Q. Is Ameren Missouri's proposed solar farm economically feasible?

A. Based on my review of the application it appears that Ameren Missouri has done its due diligence in pursuing a least cost option in securing the renewable generation.⁴

⁴ MISO is in the process of reexamining its capacity accreditation generally and wind and solar resources specifically. This will almost certainly result in a downgrade in those resources due to reliability concerns. This calls into question much of Ameren Missouri's IRP analysis predicated on renewable generation replacing its fossil fuel generation as a long-term, least-cost and reliable solution. Notwithstanding this likely new valuation, other immediate factors (e.g., tax credits, long-lead time on projects, costs being borne by participants, etc...) likely make this project economically feasible.

1 **Q. Does Ameren Missouri’s proposed solar farm (service) promote the public interest?**

2 A. As a general proposition it appears to. Of course, details of the contract and a consideration of
3 potential liabilities should be factored into the assessment of whether or not there is a net
4 positive outcome for ratepayers and by extension promotes the public interest. As to the
5 contract terms, including generation interconnection agreement costs and the details of the
6 build-transfer-agreement I defer to the MO PSC Staff’s analysis. As it pertains to potential
7 liabilities associated with the construction, operation and decommissioning of the solar panels
8 I have concerns that need to be addressed before I could provide my endorsement.

9 **Q. What potential liabilities to the solar farm’s success have you identified?**

10 A. Ameren’s Missouri’s application lacks detail on the following potential liabilities:

- 11 • Proper utility-scale solar conservation habitat practices;
- 12 • Appropriate storm water run-off management plans;
- 13 • The need to confirm that solar panel selections were not sourced from Chinese forced
14 Uyghur labor camps; and
- 15 • Plans over end-of-life management considerations

16 **Q. What are examples of appropriate habitat conservation actions for solar farms?**

17 A. Conservation and land-use restoration should utilize best-management practices with
18 pragmatic considerations. Vegetation and habitat management plans should include reseeded
19 the developed land with native species and actions to minimize potential violations of the
20 Endangered Species Act. Developers and the utility should also consider the impact on
21 pollinators (e.g., bees) and whether or not the site selection is infringing on any historical
22 nesting or bat hibernacula sites. Additionally, the siting of the solar farm needs to consider a
23 way to minimize avian mortality concerns (e.g., birds not mistaking solar panels for bodies of
24 water. Also known as “the lake effect”).⁵

⁵ Hathcock, C. (2018) “Literature review on impacts to avian species from solar energy collection and suggested mitigations.” U.S. Department of Energy.

<https://www.energy.gov/sites/prod/files/2019/03/f61/Hathcock%202018.pdf>;

1 **Q. Why is this important?**

2 A. Because violations of U.S. Fish & Wildlife and other applicable conservation statutes can result
3 in additional costs, potential legal challenges, and may negatively impact future additional
4 renewable development.

5 **Q. Why is storm water run-off management important?**

6 A. Water resource management is an important component of environmentally-sound planning
7 when siting large-scale solar facilities. Failure to account for drainage patterns beyond property
8 boundaries and potential “worst case” weather events could result in potential cease and desist
9 orders or future local/state fines. Proper mitigation should include site-specific soil mapping,
10 and a pre-and post-construction hydrologic analysis to mitigate future storm water problems.

11 **Q. What is your concern regarding sourcing solar panels from Chinese forced Uyghur labor
12 camps?**

13 A. In December 2021, Congress overwhelmingly adopted the Uyghur Forced Labor Prevention
14 Act (UFLPA) with strong bipartisan support, passing the House 428–1 and adopted in the
15 Senate by unanimous consent. It was signed into law by President Biden on December 23,
16 2021. The UFLPA requires the administration to take significant new action to prevent
17 goods produced in the Xinjiang Uyghur Autonomous Region (XUAR) of China, where
18 state-sponsored forced labor is widespread, from entering U.S. markets.⁶ The U.S. is among
19 several countries to have accused China of committing genocide and crimes against

Kagan, R. et al (2014) Avian mortality at solar energy facilities in Southern California: A preliminary analysis.

<https://usiraq.procon.org/sourcefiles/avian-mortality-solar-energy-ivanpah-apr-2014.PDF>;

Horowitz, K. et al (2020) Capital Costs for Dual-Use Photovoltaic Installations: 2020 Benchmark for Ground-Mounted PV Systems with Pollinator-Friendly Vegetation, Grazing, and Crops. National Renewable Energy Lab.

<https://www.nrel.gov/docs/fy21osti/77811.pdf> ;

Smith, J. & J.F. Dwyer (2016) “Avian interactions with renewable energy infrastructure: An update.” *The Condor*. Vol 118, pp. 411-423. <https://academic.oup.com/condor/article/118/2/411/5153228?login=true> ; and

Koscuich, K. et al. (2020) A summary of bird mortality at photovoltaic utility scale solar facilities in the Southwestern U.S. Plos One. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0232034>

⁶ U.S. Customs and Border Protection. (2022) Uyghur Forced Labor Prevention Act.

<https://www.cbp.gov/trade/forced-labor/UFLPA>

1 humanity through its repression of the Uyghurs. The law bans all imports from the Chinese
2 region of Xinjiang unless the products are determined to not be connected with forced labor.

3 According to a recent *PV Magazine* article:

4 To be in compliance with UFLPA, companies must provide a comprehensive supply
5 chain mapping, a complete list of all workers at an entity subject to “rebuttable
6 presumption” that there is a connection to forced labor, and proof that workers were
7 not subject to conditions typical of forced labor practices and are there voluntarily.⁷

8 According to a report by the United Kingdom’s Sheffield Hallam University, Xinjiang
9 produces about 45% of the world’s supply of polysilicon a key component in solar panels.⁸

10 Ameren Missouri should verify that its Boomtown solar panels are in compliance with the
11 law and not sourced from forced labor.

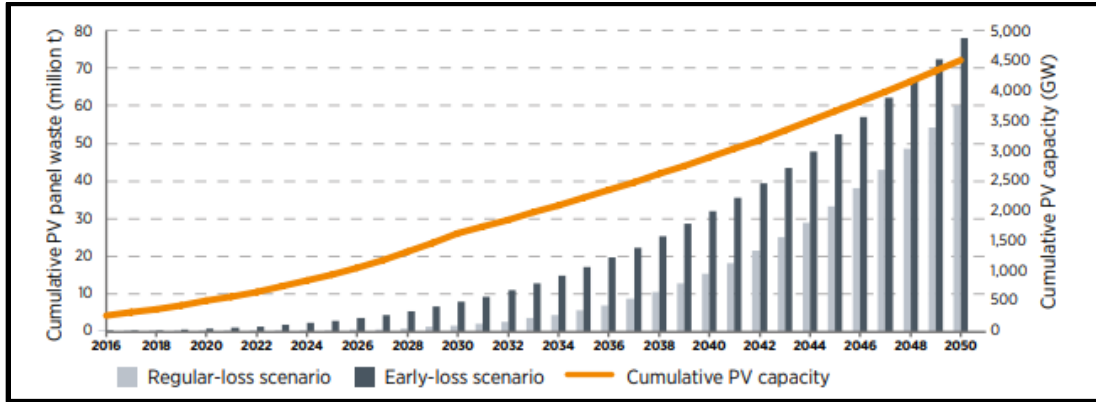
12 **Q. Why are end-of-life management considerations important?**

13 A. The International Renewable Energy (“IRENA”) has estimated that solar panel waste could
14 exceed 10% of all global electronic waste. Figure 1 provides the estimated cumulative global
15 waste of PV panels through 2050 and Figure 2 shows projected estimates for the United States
16 as modeled by IRENA in 2016.

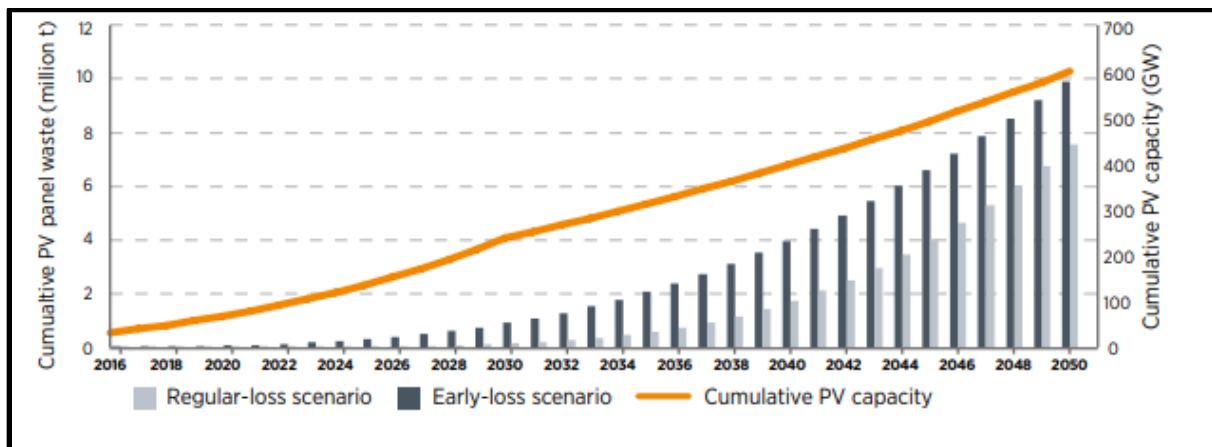
⁷ Kennedy, R. (2022) More than 3 GW of solar panels held by US customs under forced labor law. *PV Magazine*.
<https://www.pv-magazine.com/2022/08/16/more-than-3-gw-of-solar-panels-held-by-us-customs-under-forced-labor-law/#:~:text=The%20UFLPA%20was%20passed%20last,be%20connected%20to%20forced%20labor.>

⁸⁸ See GM-2.

1 Figure 1: Estimated cumulative global waste volumes (million t) of end-of-life PV panels⁹



2
3 Figure 1: Estimated cumulative global waste volumes (million t) of end-of-life PV panels¹⁰



4
5 Besides recovering valuable finite silver, aluminum and silicon material from decommissioned
6 PV modules, other motivations for recycling PV include legal liabilities associated with toxic
7 chemicals and hazardous materials such as lead, and cadmium. According to the U.S.
8 Environmental Protection Agency (“EPA”) if these metals are present in high enough

⁹ IRENA (2016) Management: Solar Photovoltaic Panels. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf?rev=49a75178e38c46288a18753346fb0b09

¹⁰ Ibid.

1 quantities in the solar panels, solar panel waste could be a hazardous waste under the Resource
2 Conservation and Recovery Act (“RCRA”).¹¹

3 To my knowledge, there are no existing laws in the State of Illinois (or Missouri) regarding
4 solar disposal or recycling mandates, but new solar panel End-of-Life polices and/or laws have
5 appeared in at least five states (California, Hawaii, New Jersey, North Carolina and
6 Washington). Given Illinois’ aggressive renewable and energy policy it would not be
7 unreasonable to expect Illinois and federal policy and/or law governing the proper disposal of
8 end-of-life solar panels during the operating life of this solar farm.

9 Ameren Missouri should verify that the Boomtown solar panel selections do not include
10 toxic materials, so as to minimize decommissioning costs later in life, and work with
11 stakeholders and the industry at large for environmentally sound and cost-effective ways to
12 either recycle or dispose the panels at the end of their life.

13 **Q. How do you recommend that your concerns be addressed?**

14 A. Recent Clean Air Act and potential Endangered Species Act violations related to Ameren
15 Missouri owned and operated generation sources underscore the importance of ensuring that
16 proper due diligence is being conducted throughout the application process.

17 As it stands, I recommend the Commission not issue a CCN for this solar farm until Ameren
18 Missouri has demonstrated that my concerns are mitigated. I plan to follow-up with detailed
19 discovery on these topics before surrebuttal is filed and will update my testimony accordingly.
20 I also welcome Ameren Missouri’s response and (hopefully) description of actions taken to
21 assuage the concerns I have raised in this rebuttal testimony.

22 **II. RENEWABLE SOLUTIONS PROGRAM**

23 **Q. Should the Commission consider a new tariffed customer program in this case?**

24 A. No, it should not.

¹¹ US.EPA (2022) End-of-Life Solar Panels: Regulations and Management. <https://www.epa.gov/hw/end-life-solar-panels-regulations-and-management#Are%20Solar%20Panels%20Hazardous%20Waste?>

1 **Q. Why not?**

2 A. I have concerns about the proper pricing of this service based on Ameren Missouri's 2021 class
3 cost of service data.

4 **Q. Where should the Commission consider Ameren Missouri's Renewable Solutions
5 Program?**

6 A. I believe the current rate case would afford a better venue to reexamine those assumptions
7 moving forward. As such, I recommend that Ameren Missouri file supplemental direct in its
8 currently filed rate case.

9 **Q. Why?**

10 A. A rate case provides the proper venue to consider all relevant factors necessary in judging the
11 appropriateness of a new tariffed program. Additionally, the underlying methodology Mr.
12 Wills used to support his analysis was not generally agreed upon by parties in the last rate case
13 and will no doubt be dated based on the outcome of Ameren Missouri's currently pending
14 general electric rates case.

15 **Q. Do you have concerns with how Ameren Missouri's Renewable Solutions Program is
16 designed?**

17 A. Yes, I view it to have a fundamental flaw as to ratepayers' risk. Each one of our electric investor
18 owned utilities in Missouri has a Commission-approved customer-centric green tariff offering
19 for its industrial, commercial, and residential customers. In each case, the Commission has
20 approved a 50/50 risk sharing mitigation measure designed to ensure non-participating
21 ratepayers' risk is minimized if renewable build-out exceeds demand. Ameren Missouri's
22 Renewable Solutions Program is silent on this feature.

23 **Q. What do you recommend to address this fundamental flaw?**

24 A. I recommend that Ameren Missouri withdraw Mr. Wills testimony from this proceeding and
25 refile it as supplement direct in the Company's current rate case. Additionally, I recommend
26 that Mr. Wills include the standard risk-mitigation feature that has been agreed to by all parties
27 and ordered by the Commission in every previous customer-centric green tariffed program.

1 **Q. Does this conclude your testimony?**

2 A. Yes.

**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)
Approval of a Subscription-Based Renewable)
Program.)
Case No. EA-2022-0245

AFFIDAVIT OF GEOFF MARKE

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

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

- 1. My name is Geoff Marke. I am a Chief Economist for the Office of the Public Counsel.
- 2. Attached hereto and made a part hereof for all purposes is my 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 21st day of December 2022.



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



Tiffany Hildebrand
Notary Public

My Commission expires August 8, 2023.