

Rebuttal Testimony of Jeff Plewes

CASE NO. 2021-00370

February 21, 2024

On Behalf of

Kentucky Power Company

Prepared by

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REBUTTAL TESTIMONY OF JEFF PLEWES

1 **Q. Please state your name.**

2 A. My name is Jeff Plewes.

3 **Q. Are you the same Jeff Plewes who filed direct testimony in Case No. 2021-**
4 **00370?**

5 A. Yes.

6 **Q. On whose behalf are you testifying on rebuttal?**

7 A. I am testifying on behalf of Kentucky Power Company ("Kentucky Power" or the
8 "Company").

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

10 A. The purpose of my rebuttal testimony is to respond to portions of the direct
11 testimony of witness Lane Kollen that was filed on behalf of the Office of the
12 Attorney General of the Commonwealth of Kentucky and the Kentucky Industrial
13 Utility Customers, Inc. (collectively "AG/KIUC").¹ I address his stated concerns
14 about the performance of the Company's coal-fired generation assets,

¹ Case No. 2021-00370, Direct Testimony and Exhibits of Lane Kollen, December 2023 (Hereafter "Kollen Direct Testimony").

1 specifically the Mitchell units. He bases these concerns on a simple review of
2 capacity factors.

3 **Q. What are the main findings of your rebuttal testimony?**

4 A. My review resulted in the following main findings:

5 1. **The capacity factors of Kentucky Power’s coal-fired generation**
6 **assets are not relevant in considering whether the Company has**
7 **sufficient capacity to meet the maximum requirements of its**
8 **customers.** – As I demonstrated in my direct testimony, Kentucky
9 Power reasonably delivers resource adequacy through its PJM
10 membership. The capacity factors of its owned resources are not
11 relevant in determining the resource adequacy provided. A plant’s
12 capacity factor is an indicator of how much energy it produces relative
13 to its capability, and therefore an indicator of how much energy it sells
14 into the market. That is unrelated to the amount of energy that Kentucky
15 Power can reliably serve to its customers. As I explained in my direct
16 testimony, Kentucky Power has sufficient capacity to meet the maximum
17 estimated requirements of its customers through its participation in the
18 PJM power pool.² In fact, many utilities that belong to PJM provide the

² Cause No. 2021-00370, Direct Testimony of Jeff Plewes, December 22, 2023 (Hereafter “Plewes Direct Testimony”) p. 5-6.

1 same high level of resource adequacy through their PJM membership
2 without owning any power plants.

3 **2. Plant performance and economics are not fully captured in simple**
4 **reviews of capacity factors, particularly when the review only**
5 **involves a comparison to one other coal plant.** – A capacity factor
6 only indicates how much energy a plant generates relative to its
7 capability. It does not explain why the plant generated that quantity of
8 energy, and it is not a reliable or appropriate measure of performance.
9 In many cases, a lower capacity factor is preferable to a higher capacity
10 factor—for example, during periods with low power prices relative to
11 generation costs. At those times, electricity can be obtained at a lower
12 cost from the market than from operating the owned resources. To take
13 another example, a plant’s capacity factor can be constrained by
14 reasonably encountered challenges, as was common for coal plants in
15 PJM from late 2021 through late 2022. Also, a plant’s capacity factor can
16 be limited if there is a need to undertake reasonable and prudent
17 planned maintenance. To understand plant performance, it is important
18 to evaluate all the factors that lead to capacity factors, not just the
19 capacity factors themselves.

1 **3. The Mitchell plant has operated at levels that are reasonable.** – Over
2 the past six years, the Mitchell plant has tended to run when economics
3 suggest doing so is favorable. The exception is the period from late 2021
4 through late 2022, during which electricity prices were relatively high, but
5 the plant’s operation was constrained by drastic, unexpected market
6 dislocations and several coal delivery issues that were beyond the
7 Company’s reasonable control or anticipation. The majority of coal
8 plants in PJM did not increase capacity factors in 2022 in response to
9 the higher electricity prices.

10 **Q. What is a capacity factor?**

11 A. In a response to a data request, witness Kollen provide the EIA’s definition of
12 capacity factor: “*The ratio of the electrical energy produced by a generating unit*
13 *for the period of time considered to the electrical energy that could have been*
14 *produced at continuous full power operation during the same period.*”³ This is a
15 fine definition of the concept. I’ll add that the calculation of a plant’s capacity
16 factor for any period is based on the following simple equation:

17 [Actual generation (MWh)] / [Unit capacity (MW) * 8760⁴ (hrs)]

³ Response to Kentucky Power Company, 1-10 (dated 2/7/24).

⁴ Hours per year. 8,784 hours are used in leap years.

1 **Q. What determines the capacity factor of an electric generating unit over a**
2 **specific period?**

3 A. Assuming the unit's capacity is held constant for the period, the only variable in
4 the capacity factor equation is the quantity of electricity generated, which is
5 generally measured in megawatt hours (MWh). The quantity of electricity
6 generated by a generating unit over a specific period is a function of plant
7 availability, fuel availability, the relative economics of running the plant versus
8 other sources of power, and market participation strategies by plant owners. If
9 there is a constraint on plant or fuel availability, that constraint may tend to
10 reduce the capacity factor. If a plant is committed to economic dispatch, which
11 is common in most energy markets and generally leads to lower costs for
12 customers, then the capacity factor will generally be higher when generation
13 costs are below energy prices, and lower when generation costs are above
14 energy prices. Of course, in most markets, power plant owners can also choose
15 to run their units even when they are not economic, thereby increasing the
16 capacity factor, but this strategy generally results in higher costs to customers.

1 **Q. Are capacity factors reasonable indicators of whether a Company**
2 **provides sufficient capacity to meet the maximum requirements of its**
3 **customers?**

4 A. No. As I demonstrated in my direct testimony, Kentucky Power ensures
5 resource adequacy through its PJM membership. Through its reliability
6 requirements, PJM ensures that every load-serving entity in the balancing
7 authority has sufficient capacity to meet their customers' maximum
8 requirements. PJM meets or exceeds industry standard resource adequacy
9 requirements. PJM has not experienced any load shedding from resource
10 adequacy events in its footprint since 1994, including throughout Winter Storm
11 Elliott. A recent NERC assessment determined that in PJM "...resource
12 adequacy criteria are met, and it is unlikely for electricity supply shortfalls to
13 occur even when demand is above forecasts or resource performance is
14 abnormally low."⁵

15 As a PJM load-serving entity, Kentucky Power must meet certain PJM-defined
16 capacity obligations, which the Company does through the FRR alternative, as
17 I described in my direct testimony.⁶ The Company satisfies its obligations as an
18 FRR entity by contributing a combination of contracted resources and owned

⁵ [NERC, 2023 Long-Term Reliability Assessment, pp. 9, December 2023.](https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf)
https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf

⁶ Plewes Direct Testimony, p.42-51.

1 resources, including the Mitchell plant, to the PJM power pool. The capacity
2 factors of the Company's owned resources have no impact on the Company's
3 ability to satisfy its capacity obligations to PJM, or on PJM's ability to ensure
4 resource adequacy for Kentucky Power and all other load-serving entities
5 participating in the power pool.

6 **Q. How have the annual capacity factors of the Mitchell units compared to**
7 **the capacity factors that would be expected based on economics and**
8 **availability?**

9 A. Capacity factors are the outcomes of a variety of complex plant and market
10 dynamics. Therefore, there is no simple way to form a view on precise
11 "expected" capacity factors. Forming such a view would require detailed
12 analysis that includes unit operating parameters, data on plant and fuel
13 availability, energy market prices, and detailed information on fuel and other
14 variable costs. This is the reason I do not believe witness Kollen should form
15 views on plant performance from a simple review of capacity factors with no
16 consideration of the many factors that led to the capacity factors.

17 It is not unreasonable to consider at a high level whether a plant's capacity factor
18 tends to reflect the known economic factors. I reviewed the annual capacity
19 factors for the Mitchell units for the six years from 2018 through 2023 and found
20 that they were consistent with what I would expect to result from economic

1 dispatch under known economic and market conditions. Quite simply – the
2 Mitchell units tended to run more in years when power prices were frequently
3 higher than generation costs, less in years when power prices were frequently
4 lower than generation costs. The exception is the period from late 2021 through
5 2022 when coal constraints greatly complicated such a review. It is not
6 reasonable to estimate a variable cost of generation for coal that was not
7 available (as I discuss further below).⁷

8 I do not agree with witness Kollen’s characterizations of the Mitchell capacity
9 factors as “low or extremely low.” Such a judgement would require establishing
10 a reference capacity factor. It should be noted that there were recent periods in
11 which capacity factors at historically low levels would have been expected
12 based on economics. In 2020, power prices were above \$25/MWh in less than
13 17% of hours.⁸ If Mitchell had an average variable cost of \$29/MWh, as was
14 reported by the source witness Kollen uses for capacity factors, the plant would
15 likely have been economic in about 10% of the hours across the entire year.⁹

⁷ In addition to uncertain “hypothetical” coal prices, during a coal constrained period every ton of coal burned is a ton of coal that cannot be burned at a later time, and thus all generation carries an opportunity cost of future generation until coal is available.

⁸ AEP Dayton Hub Real Time LMPs.

⁹ S&P Global / S&P Capital IQ. Fuel cost of \$24.89/MWh and non-fuel variable O&M costs of \$4.43/MWh. These are average and estimated costs based on public data and are used here for illustrative purposes.

1 By that measure, the Mitchell plant’s capacity factor in that year (22.4% for unit
2 1 and 30.2% for unit 2) could be considered “high.”¹⁰

3 **Q. Do Mitchell’s capacity factors in late 2021 and through 2022 indicate poor**
4 **performance of the Mitchell plant?**

5 A. No. PJM electricity prices increased substantially during this period, which
6 would tend to drive higher expected capacity factors for PJM coal plants in
7 2022—but only if coal were available at historical prices. However, coal was not
8 available in sufficient quantities to support higher capacity factors. Of 58
9 “medium to large” coal units in PJM operating in that period, only 23 units
10 increased their capacity factors from 2021 to 2022.¹¹ Mitchell 1 was one of
11 those units. Three of the four Spurlock units had lower capacity factors in 2022
12 than 2021. Clearly there were constraints on the availability of PJM coal units to
13 dispatch more in response to higher prices. These constraints were consistent
14 across many coal plants and owners.

15 It is not reasonable to judge plant performance based on capacity factors alone.

16 When considering at a high level the many factors that drove capacity factors

¹⁰ This outcome was mostly due to the plant running at low levels in hours when not economic to ensure availability and to intentionally burn coal to make room for expected deliveries.

¹¹ Only units over 180 MW were considered. This represents the median sized coal unit in PJM. The Mitchell units are 770 MW and 790 MW in summer capacity.

1 over the relevant period, there is no indication of poor performance by the
2 Mitchell units.

3 **Q. Does this conclude your rebuttal testimony?**

4 A. Yes.



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 I, Marilyn Michelle Caldwell, did witness the participants named above electronically sign this document.



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VERIFICATION

The undersigned, Jeffrey C. Plewes, being duly sworn, deposes and says he is a Principal in the Energy Practice of Charles River Associates that he has personal knowledge of the matters set forth in the foregoing testimony and the information contained therein is true and correct to the best of his information, knowledge, and belief after reasonable inquiry.

Jeffrey Plewes

Jeffrey C. Plewes

Commonwealth of Kentucky)
County of Boyd)

Case No. 2021-00370

Subscribed and sworn to before me, a Notary Public in and before said County and State, by Jeffrey C. Plewes, on February 16, 2024

Notary [Signature]

MARILYN MICHELLE CALDWELL
ONLINE NOTARY PUBLIC
STATE AT LARGE KENTUCKY
Commission # KYNP71841
My Commission Expires May 05, 2027

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