COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of*:*

ELECTRONIC 2023 INTEGRATED RESOURCE	**)**	**CASE NO.**
PLAN OF BIG RIVERS ELECTRIC CORPORATION	**)**	**2023-00310**

BIG RIVERS ELECTRIC CORPORATION'S
RESPONSES TO COMMISSION STAFF'S
FIRST REQUEST FOR INFORMATION

Big Rivers Electric Corporation ("Big Rivers" or the "Company") by counsel, files its responses to Commission Staff's First Request for Information, issued in the above-captioned case on December 8, 2023.

FILED: January 5, 2024

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
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REQUEST NO. 1-1: ***Refer to BREC's 2023 Integrated Resource Plan (IRP), Section 2, page 19. Provide an update to the solar power purchase agreement based in Henderson/Webster Counties.***

RESPONSE: The solar developer issued a press release about the project on December 14, 2023, which is available on National Grid website.[1] Tree clearing for the project has been underway for several weeks. Based on conversations with the developer, Big Rivers believes a realistic target for commercial operation of the facility is first quarter 2025.

Witness: Nathanial A. Berry

[1] https://www.nationalgridus.com/News/2023/12/National-Grid-Renewables-Breaks-Ground-on-Largest-Solar-Project-in-Kentucky/#:~:text=National%20Grid%20Renewables%20Breaks%20Ground%20on%20Largest%20Solar%20Project%20in%20Kentucky,-Dec%2014%2C%202023&text=Minneapolis%2C%20MN%20%E2%80%93%20Today%2C%20National,Henderson%20and%20Webster%20Counties%2C%20Kentucky

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REQUEST NO. 1-2: ***Refer to the IRP, Section 2, page 25; Table 2.2.8(a), page 28; Section 4, Table 4.2(a), page 66; and Table 4.3(a), page 67.***

a. Explain whether BREC is generating and transmitting energy to serve its Non-Member customers during the time it has a system peak.

b. If so, explain why Table 2.2.8 does not include the coincident MW and MWh contributions associated with the non-Member load.

c. Explain whether MISO considers BREC's obligation to serve non-Members such that the non-Member load is reflected in BREC's planning reserve margin requirement (PRMR).

RESPONSE:

a. Big Rivers is obligated to generate when units are cleared and called upon by MISO, which may be at the time of a system peak, regardless of energy requirements of the Non-Member customers. Big Rivers neither generates nor transmits energy to serve the Non-Member customers in the Southwest Power Pool ("SPP").[1]

b. See response a., above. Non-Member peak energy requirements may or may not be coincident with Big Rivers' system load.

[1] See Tariff Filing No. TFS2021-00516, *Big River Corporation's Filing of Proposed Amendments to Contracts with the City of Wayne, Nebraska; the City of Wakefield, Nebraska; and the Northeast Nebraska Public Power District; and a Related Power Hedge Contract.*

c. The SPP Non-Member customer transactions are accounted for in the SPP's Engineering Database Submittal Tool. Big Rivers' obligation to serve the other non-Members is reflected as a capacity transaction in MISO's Module E Capacity Tracking Tool; therefore, non-Member transactions are reflected in Big Rivers' planning reserve requirement (PRMR).

Witness: Terry Wright, Jr.

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REQUEST NO. 1-3: ***Refer to the IRP, Section 2, Table 2.2.8(a), page 28.***

a. In the Rural Annual CP column, beginning in 2021-2023, there is a large increase, a decrease, and then large increase in CP. Explain the apparent gain, and loss in coincident peak demand.

b. Explain why the AUX CP column has no forecasted values.

RESPONSE:

a. The data for 2021 and 2022 represents historical CP, which occurred for those years. The data for 2023 is a projected CP based on Clearsprings' forecast models. The elevated Rural CP in 2022 is a result of Winter Storm Elliot, where temperatures in Big Rivers' service territory dropped to -6 degrees Fahrenheit. These temperatures are outside of the 20-year historical weather averages that were used for the baseline forecasts.

b. The values for Aux. power are expected to remain insignificant; therefore they were not forecasted.

Witness: Terry Wright, Jr.

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REQUEST NO. 1-4: ***Refer to the IRP, Section 3, page 40. State how BREC determined the optimal number of years to use to determine weather averages, considering the effect of sample size and temperatures trending upwards.***

RESPONSE: Twenty-year weather averages are commonly used in load forecasting. Additionally, there are some data-availability challenges with gathering the data for timeframes greater than 20 years. Appendix A, pages 77 and 78, also show that there were small differences found when comparing weather metrics across multiple timeframes.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

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REQUEST NO. 1-5: ***Refer to the IRP, Section 3, pages 41-42. Refer also to BREC's Application, Exhibit D, page 9, in Case No. 2022-00433.[1] Reconcile the statement in the IRP that BREC had no Critical Infrastructure Protection (CIP) non-compliance items with the assertions of need in Case No. 2022-00433 for security upgrades to comply with North American Electric Reliability Corporation (NERC) regulations.***

RESPONSE:

As indicated, SERC identified no potential non-compliance items associated with the specific NERC standards included in the 2022 audit. This means Big Rivers was able to meet the minimum requirements included in those standards. That said, the upgraded facilities approved in Case No. 2022-00433 are necessary to improve Big Rivers' ability to comply with the CIP standards moving forward. Further, the facilities will allow Big Rivers to employ best practices and significantly enhance its physical and cyber security program. These assertions supported the relief requested in Case No. 2022-00433 and remain true.[2]

[1] Case No. 2022-00433, *Electronic Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity Authorizing Construction of a New Transmission Operations Center and an Order Authorizing Big Rivers to Dispose of Property* (filed Dec. 22, 2022).

[2] *See, e.g., id.*, Application, Exhibit D, page 13 [redacted]

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Witness: Christopher S. Bradley

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REQUEST NO. 1-6: ***Refer to the IRP, Section 3, page 44. State how BREC decided on bill credits based on 40 percent of margins earned in excess of 1.30 Times Income Earned Ratio (TIER).***

RESPONSE: In the June 25, 2020, Order in PSC Case No. 2020-00064,[1] the Commission ordered Big Rivers to base bill credits on 40 percent of margins earned in excess of 1.30 Times Income Earned Ratio (TIER), modifying a settlement with Kentucky Industrial Utility Customers, Inc. (KIUC) and Attorney General of the Commonwealth of Kentucky, by and through the Office of Rate Intervention, which had based the bill credits on 50 percent of margins in excess of 1.30 TIER.

Witness: Talina R. Mathews

[1] See, *Electronic Application of Big Rivers Electric Corporation for Approval to Modify Its MRSM Tariff, Cease Deferring Depreciation Expenses, Establish Regulatory Assets, Amortize Regulatory Assets, and Other Appropriate Relief*, Case No. 2020-00064, Order (Jun. 25, 2020).

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REQUEST NO. 1-7: ***Refer to IRP, Section 3, page 57 and Section 7, page 142. State how the enactment of KRS 278.264 changed BREC's capacity modeling and affected the cost of IRP plan alternatives.***

RESPONSE: Potential implications of future compliance with KRS 278.264 were not expressly reflected in the IRP's capacity modeling, which has been an ongoing effort since before the enactment of the statute. That said, Section 3 of Big Rivers' 2023 IRP complies with 807 KAR 5:058, Section 6 and "… identifies notable events and developments that have occurred during the past three (3) years which support or inform this 2023 IRP."[1] Big Rivers believes the enactment of KRS 278.264, demonstrating the Kentucky General Assembly's concerns related to long-term resource planning, supports the direction of the IRP—retain Wilson Station, Big Rivers' most efficient baseload resource, and identify reliable, dispatchable resources that will complement intermittent renewable resources.

Witness: Nathanial A. Berry

[1] 2023 IRP at page 39 of the IRP.

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REQUEST NO. 1-8: ***Refer to the IRP, Section 4, Footnote 70 and Table 4.4(a), page 69; and Section 7, Footnote 83 and Table 7.1.6(a), page 132.***

a. Explain how the energy per the Kentucky Municipal Electric Association (KYMEA) contract is actually provided.

b. If not on a call basis, explain why BREC is modeling this energy different from the way it's actually provided and different from its load forecast.

c. The modeled Non-Member energy usage depicted in Table 7.1.6(a) is significantly less than that depicted in Table 4.4(a), page 69. Reconcile the differences.

RESPONSE:

a. KYMEA or its scheduling agent notifies Big Rivers of the amount to be delivered to the [redacted] Commercial Pricing Node, up to the full contract amount, and the hours of delivery for the next operating day. Big Rivers then submits this information to MISO as a Financial Schedule, which indicates that the buyer is then responsible for MISO market charges associated with these transactions.

b. This sale is essentially a call option – see footnote 70 on page 69 and footnote 83 on page 132 of Big Rivers' IRP.

c. Table 4.4(a) reflects a simple estimate of all Non-Member sales including Nebraska and OMU (net of their SEPA hydropower supply), as well as KYMEA at an estimated annual amount. Table 7.1.6(a) differs in the following ways: (1) it does not include Nebraska sales (which are supplied from purchases in SPP); (2) OMU amounts are

gross (including their SEPA hydropower supply); and (3) the KYMEA amounts reflect a reduced obligation based on an hourly LMP forecast, which changes as fuel prices and market conditions vary over time. See the table below for more details.

	Non-Member Energy Estimates			Reconciliation			
	Forecast Table 4.4(a)	IRP EnCompass Analysis Table 7.1.6(a)	*Total Difference	Difference Due to OMU Net of SEPA in forecast vs Gross of SEPA EnCompass**		Difference Due to KYMEA simple estimate in forecast vs Dispatch based on hourly market in EnCompass	Difference Due to Nebraska included in forecast vs NOT included in EnCompass
	GWH	GWH	GWH	GWH		GWH	GWH
2023	2,107	1,621	486	(7)		(0)	493
2024	2,107	1,658	449	(13)		(31)	493
2025	2,107	1,378	729	(14)		251	493
2026	2,107	1,174	933	(18)		459	493
2027	1,081	199	882	134	**	586	162
2028	785	171	614	-		614	-
2029	325	194	131	-		131	-

*Total Non-Member energy utilized in EnCompass differs from the load forecast for various reasons. OMU energy is the total value prior to any allocations of energy from OMU's share of SEPA hydropower, and is based on an hourly profile curve. KYMEA is modeled as a call option in the model which results in a reduced obligation to KYMEA as fuel prices and Market conditions vary over time.

**2027 forecast for preparing Table 4.4(a) Non-Member Energy Requirements had incorrectly calculated OMU as terminating in March 2027, instead of December 2026. This had been corrected for the EnCompass model run reflected in Table 7.1.6(a)

Witness: Terry Wright, Jr.

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REQUEST NO. 1-9: ***Refer to the IRP, Section 2, Table 2.2.8(a), page 28; Section 4, Table 4.3(a), page 67; and Section 7, Table 7.1.6(a), page 132. Reconcile the apparent differences between member Annual Peaks.***

RESPONSE: Table 2.2.8(a) Total Annual Coincidental Peak ("CP") is the same as Total Annual Big Rivers CP on Table 4.3(a), where both are listed in kW. Table 7.1.6(a), showing Member Peak in MW is lower by Transmission Losses and a Big Rivers-to-MISO Coincidence factor, which is required for EnCompass to accurately perform its Power System Optimization analysis. See the table below for the reconciliation.

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Member Annual Peaks					
	Table 2.2.8(a)* Including Transmission Losses	Table 4.3(a)** Total Annual Big Rivers CP	Less Transmission Losses	Less Coincidence Factor for Big Rivers CP to MISO CP	Table 7.1.6(a) Base Case Member Peak
	in MW	in MW	in MW	MW	MW
2023	752	752	(18)	(21)	714
2024	840	840	(20)	(22)	798
2025	861	861	(20)	(23)	818
2026	863	863	(20)	(23)	820
2027	865	865	(20)	(23)	822
2028	868	868	(20)	(23)	824
2029	869	869	(20)	(23)	825
2030	872	872	(20)	(23)	828
2031	874	874	(20)	(23)	830
2032	878	878	(21)	(24)	834
2033	879	879	(21)	(24)	835
2034	881	881	(21)	(24)	837
2035	883	883	(21)	(24)	839
2036	886	886	(21)	(24)	842
2037	888	888	(21)	(23)	844
2038	890	890	(21)	(24)	845
2039	892	892	(21)	(24)	847
2040	893	893	(21)	(24)	848
2041	895	895	(21)	(24)	850
2042	896	896	(21)	(24)	851
	* Table 2.2.8(a) 2023 Big Rivers Member CP Load Forecast (kW)				
	** Table 4.3(a) Forecast 2023 Total system NCP				

Witness: Terry Wright, Jr.

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REQUEST NO. 1-10: ***Refer to the IRP, Section 4, Table 4.3(a), page 67.***

a. Confirm that Non-Member sales are designated in MW, and explain if it cannot be confirmed.

b. Provide a metric for each of the values listed in Table 4.3(a).

RESPONSE:

a. Non-Member Sales on Table 4.3(a) units are designated in kW.

b. Units for all items on Table 4.3(a) Total System NCP are designated in kW.

Witness: Terry Wright, Jr.

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REQUEST NO. 1-11: ***Refer to the IRP, Section 5, page 75. Explain why demand-side management (DSM) projections were limited to a ten-year period.***

RESPONSE: Demand-side management potential studies such as the one described in Section 5 of the IRP rely on evaluations of current technologies, costs, federal standards, and market conditions in estimating the cost-effectiveness of the various measures. Because of this, studies of this type typically have a relatively short shelf-life and typically require re-evaluation on a regular basis. Because technologies, costs, standards, and market conditions can change rapidly, projecting efficiency savings beyond ten years carries inherent risks of uncertainty.

Big Rivers has evaluated DSM on a ten-year basis through the last five IRP cycles. Based on Clearspring Energy's experience, ten years is a rather long window to project DSM program savings. Most utility DSM programs Clearspring Energy works with are re-evaluated on a regular basis to combat that uncertainty risk – often every 3-4 years (which is consistent with the current Kentucky IRP schedule).

Witness: Joshua Hoyt (Clearspring)

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REQUEST NO. 1-12: ***Refer to the IRP, Section 5, page 76. Provide all end-use survey data used to predict load.***

RESPONSE: Five different surveys were used in the DSM study. One was primary research conducted by Big Rivers, while the other four were third-party data sets. In the case of third-party data, URL links are provided to relevant sources. In all cases Excel files with extracted data accompany this Response as attachments. The five surveys are:

Big Rivers Residential Appliance Survey: a CONFIDENTIAL primary research study survey of Big Rivers' Member-Owners' residential members conducted in 2022 by a third-party contractor. File = Big Rivers 2022 Final Weighted Crosstabs – TOTAL Confidential.xlsx. This file is being produced subject to a motion for confidential treatment.

EIA Residential Energy Consumption Survey: a survey of residential households across the United States and regionally conducted by the Energy Information Administration (DOE). The most recent cohort is the 2020 survey (released in 2023); however, the newest version had not been released due to delays at EIA at the time the study was completed and the 2018 release was used. https://www.eia.gov/consumption/residential/ Files: RECS_ce5.3a.xlsx, RECS_ce5.3b.xlsx

EIA Commercial Buildings Energy Consumption Survey: a survey of commercial buildings across the United States and regionally conducted by the Energy Information

Administration (DOE). The most recent cohort is the 2018 survey (released in 2021-2022). https://www.eia.gov/consumption/commercial/ Files: CBECS_c13.xlsx, CBECS_e6.xlsx

EIA Manufacturing Energy Consumption Survey: a survey of manufacturing enterprises across the United States and regionally conducted by the Energy Information Administration (DOE). The most recent cohort is the 2018 survey (released in 2021). https://www.eia.gov/consumption/manufacturing/ Files: MECS_Table5_3.xlsx, MECS_Table8_6.xlsx

County Business Patterns (U.S. Census): a survey of commercial entities by county across the United States conducted by the U.S. Census Bureau. It includes the number of establishments by North American Industrial Classification System (NAICS) code, employes, etc. The most recent cohort is the 2020 survey (released in 2022). https://www.census.gov/programs-surveys/cbp.html Files: CBP2020.CB2000CBP-Data_Feb23.xlsx

Witness: Joshua Hoyt (Clearspring)

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REQUEST NO. 1-13: ***Refer to the IRP, Section 7, page 105.***

a. Explain the rationale for simulating a typical two day week as opposed to a seven-day week.

b. Define typical, as used therein, and explain the determination of a typical two-day week, 52 weeks per year.

RESPONSE:

a. The EnCompass model was configured to simulate a typical two-day week (one on-peak day and one off-peak day) for expansion planning purposes. Simplifying the simulations from a Typical Week to a Typical 2-day period was done to reduce simulation run times. In our professional experience, the goal of the simulations to find the least cost resource selections are mainly unaffected by the reduction in simulation time.

b. "Typical" means a representative on-peak day (Monday through Friday) and an off-peak day (Saturday and Sunday) for each month of the simulation.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-14: ***Refer to the IRP, Section 7, page 106.***

a. Explain whether the Encompass model was allowed to retire the Green units at any time over the forecast horizon. If not, explain why not.

b. Explain whether the EnCompass model was allowed to retire the Reid combustion Turbine at any time over the forecast horizon. If not, explain why not.

c. Explain whether the Encompass model, if allowed, would have retired the Wilson unit at any time over the forecast horizon.

RESPONSE:

a. The Green units were optimized within EnCompass based on either retirement in 2029 consistent with the commission-approved plan to convert the units to natural gas-fired operation scenarios or a life extension to 2043. The units were not considered for annual retirement evaluation because annual capital expenditures associated with retirement in each calendar year were not available.

b. The Reid unit was not studied for potential retirement because it provides capacity to Big River's members at a very low fixed cost annually.

c. The Wilson unit was not studied for potential retirement in this analysis as it has recently received significant upgrades and has a large unrecovered balance on Big Rivers' financial statement. It is unlikely that the model would have chosen to retire the Wilson unit and replace it with an alternative if the model had been given the option.

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Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-15: ***Refer to the IRP, Section 5, page 106. Provide ranges for all inputs referred to on page 106.***

RESPONSE:

Please refer to Table 7.1.6(a) for the Member energy and demand forecast details.

Please refer to Figure 7.1.5 (a) for the details on the natural gas commodity price forecast.

Please refer to Figure 7.1.5 (b) for the details on the forecasted around-the-clock LMP for the Indiana Hub.

Please refer to the following for details about unit cost and performance assumptions: Table 7.1.4(d), Table 7.1.4(e), Table 7.1.4(i), Table 7.1.4(j), and Table 7.1.4(k).

Please refer to Table 7.1.4(k) for details on the demand response and energy efficiency alternative.

Please refer to Table 7.1.5(a) for details on the costs of market capacity purchases.

Witness: John Christensen (1898)

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REQUEST NO. 1-16: ***Refer to the IRP, Section 7, page 107. Explain the fuel type for the Wartsila reciprocating engine.***

RESPONSE: The fuel type for the Wartsila reciprocating engine is natural gas.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-17: ***Refer to the IRP, page 107. Explain how BREC decided what generation resources to include as plan options.***

RESPONSE: BREC identified several different generic resource options—both thermal and inverter-based—that are mature, commercially available technologies with construction timelines within the study timeline. The generic resource types outlined on Page 107 of the IRP document were considered viable options for consideration in this IRP.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-18: ***Refer to the IRP, Section 7, page 108. If the EnCompass Model results included in this IRP do not represent a commitment by BREC to a specific course of action, given the time and effort it took to generate the IRP, explain what the analysis results do represent, especially in the near term.***

RESPONSE: Big Rivers recognizes that several preferred outcomes from the EnCompass modeling may be affected by constraints outside the Big Rivers' control. Including the statement that these results do not commit Big Rivers to a specific course of action was meant to convey that Big Rivers must reserve reasonable flexibility to effectively meet changing circumstances, particularly those critical assumptions, regulatory actions, policy changes, and other external pressures that Big Rivers cannot control.

Witness: Nathanial A. Berry

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REQUEST NO. 1-19: ***Refer to the IRP, Section 7, page 108. Regarding the Single Variable Analysis, explain whether BREC allowed the model to run with two variables changing as opposed to single variables. If so, explain and provide the analysis results.***

RESPONSE: Please refer to Section 7.2.2, starting on page 137 of the IRP, for additional details regarding the sensitivities studied in the expansion planning analysis phase of the IRP modeling. BREC did not evaluate combinations of the sensitivity variables because such combinations may not offer clarity on recommended actions. For example, combining Low Load with High PRMR presumes a relationship between those sensitivity variables which may not exist.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-20: ***Refer to the IRP, page 108. Provide ranges for all sensitivities referenced on page 108.***

RESPONSE:

Please refer to Figure 7.2.2(a) in Section 7.2.2; six (6) of the nine (9) sensitivities were used in the expansion planning sensitivity analysis. Clearspring provided the Load Forecast variations which align with their high and low load forecasts with normal weather. Low, base, and high gas costs were based on 10%, 50%, and 90% confidence intervals, respectively; please see Figure 7.1.5(a) in the IRP. The capital costs in the Capital Cost sensitivity are 20% higher than the base case. Each seasonal PRMR is 10% higher than the base case in the PRMR sensitivity. The Low, Mid, and High carbon emission dispatch adders were modeled starting at $5, $15, and $25 per ton, respectively, nominally throughout the study period.

Witness: John Christensen (1898)

IN THE MATTER OF:
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BIG RIVERS ELECTRIC CORPORATION
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REQUEST NO. 1-21: ***Refer to the IRP, Section 7, Figure 7.1.2(a), page 110.***

a. The figure shows that the Non-Member sales stop in 2028. Explain whether BREC intends to pursue contract renewal.

b. If the Owensboro Municipal Utility (OMU) and KYMEA contracts are renewed for the same amounts of capacity and energy, explain whether BREC has sufficient capacity to satisfy MISO's seasonal resource adequacy construct.

c. Identify and explain any provisions in BREC's contracts with OMU and KYMEA that address the ability of BREC, OMU, or KYMEA to renew the contracts, including any guaranteed right of renewal under specific circumstances.

RESPONSE:

a. At this time, Big Rivers intends to pursue contract renewals with Owensboro Municipal Utility (OMU) and KYMEA prior to the expiration of the contracts.

b. This is completely dependent on MISO's Planning Reserve Margin Requirements and the SAC Accreditation that Big Rivers receives on its units. Using SAC Accreditation levels and PRM levels from PY23-24 and assuming no Capacity Purchases/Sells, Big Rivers would be slightly short in the Summer season (-20.8), have excess capacity in the Fall season (68.5), short in the Winter season (-56.9), and have excess capacity in the Spring season (26.1). These SAC Accreditation and PRM Levels change each year on an Annual Basis.

c. Section 2.3 of the Agreement for the Purchase and Sale of Full-Requirements Capacity and Energy between Big Rivers and OMU (the OMU contracts) and Section 2.2 of the Agreement for the Purchase and Sale of Firm Capacity and Energy between Big Rivers and

KyMEA (the KyMEA contract) address renewal. CONFIDENTIAL Section 2.3 of the OMU contract provides:

Extension of Term. [redacted]

CONFIDENTIAL Section 2.2 of the KyMEA contract similarly provides:

[redacted]

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Witness: Nathanial A. Berry

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REQUEST NO. 1-22: ***Refer to the IRP, Section 7, Figure 7.1.2(b), page 111. Explain why solar is being given capacity values during the winter in 2025 and 2026, but no other years. Include in the response the MISO accredited capacity values attributable to solar.***

RESPONSE: MISO has proposed a major change to the valuation of solar, but has not yet implemented it. MISO's current methodology for the accreditation of new solar resources is to apply a 50% nameplate calculation for the first year of operation. In subsequent years, the accreditation is based on performance during peak hours, but is often around 50% annually. MISO recently transitioned to a seasonal construct for Planning Year 2023/24. At the time of this analysis, MISO had yet to publish a change in methodology for solar resources under the new seasonal construct. Please also see Big Rivers' response to PSC 1-30, related to MISO's accreditation of new solar resources.

As shown in Figure 7.2.2(b), solar is given winter capacity starting in 2025 (50% nameplate). The winter accredited capacity volume starting in 2027is so small that it does not appear in Figure 7.1.2(b).

Witness: Terry Wright, Jr.

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REQUEST NO. 1-23: ***Refer to the IRP, Section 7, Figure 7.1.2(c), page 112. Explain the reasons for coal generation declining through 2029 and then recovering to near 2024 levels.***

RESPONSE: The EnCompass model was configured to dispatch each generating unit's dispatch costs (generally fuel and variable O&M) against the forecasted LMP at each generation station. The slump in forecasted generation from Wilson over the next few years is based primarily on two factors. First, the MISO market's LMP prices are sensitive to Natural Gas prices; please refer to Figure 7.1.5(a) and Figure 7.1.5(b) where a reduction in natural gas pricing over a similar timeframe is driving softer regional LMPs. Second, please refer to Table E-1 in Appendix E, where a forecasted increase in coal pricing at the Wilson unit is expected in a similar timeframe to the reduction in forecasted generation. These two forecasted assumptions, lower LMPs and higher fuel costs, combine to impact the forecasted generation from Wilson in the IRP modeling.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-24: ***Refer to the IRP, Section 7, Figure 7.1.2(a), page 110; and Figure 7.1.2(b), page 111.***

a. Provide the data represented in the figures in excel format with all cells visible and unprotected broken out according to MISO's seasonal accredited capacity (SAC) values and with the associated planning reserve margin requirement (PRMR) basis.

b. Refer also to Section 2, Table 2.2.8, page 28. Net of Non-Member sales, explain and show any differences difference between BREC's Delivered Peak and BREC's coincident peak.

c. Refer also to BREC's October 27, 2023 Response to Commission Staff's First Request for Information, Item 4, Attachment PSC 1-4 in Case No. 2023- 00312.[3] Reconcile any differences between the information provided in the seasonally reformatted tables in part a. of this request with the table provided in Item 4.

RESPONSE:

a. Please see the requested data in Excel format provided with this response. Subsequent to filing the 2023 IRP, 1898 and Co. and Big Rivers discovered that Wilson's seasonal capacity values were based on preliminary estimates and were not updated after PY23-24 values were published while the other units were updated. This error affected Figures 7.1.2(a) and 7.1.2(b), as well as additional figures and a table in Section 7 of the IRP related to Big Rivers'

capacity position.[1] The attached CONFIDENTIAL Excel file is based on the updated Figures 7.1.2(a) and 7.1.2(b).

b. Please see the table provided as Attachment 2 to this response for subparts b and c.

c. Using the revised charts provided by 1898 for Figures 7.1.2(a) and 7.1.2(b), the principal differences would be as follows. The first difference pertains to SEPA Hydro. The charts from the IRP analysis included SEPA Capacity at 178 MWs (Installed capacity), while the tables for PSC 1-4 in Case No. 2012-00312 used 172.7 MWs, which was PY23-24's Capacity Accreditation. This lower capacity resulted from SEPA not submitting a Generation Verification Test Capacity (GVTC) Test on one of the units as it was undergoing major maintenance. The second and more significant difference pertains to differences in the Effective Load Carrying Capability (ELCC) curves for solar. The IRP model was developed based on a chart from MISO that had seasonal projections for Solar. However, the model used to answer PSC 1-4 in Case No. 2012-00312 was based on model data from IHS Markit. This difference is causing the majority of the variance for the Summer and Winter Chart for PY26-27 forward.

[1] The affected figures and table are Figures 7.1.2(a), 7.1.2(b), 7.4.1(a), 7.4.1(b), 7.4.2(a), 7.4.2(b), 7.4.3(a), and 7.4.3 (b), and Table 7.4.1(a). Updated versions of these figures and the table are provided with this response as CONFIDENTIAL Attachment 1.

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For Summer PY24-25 and Winter PY24-25, we have a large variance because the IRP Model assumed that solar would be in service by this time frame, while the response to PSC 1-4 in Case No. 2023-00312 assumed that it would not be in service until PY25-26. For Summer PY25-26, we have a variance because the response to PSC 1-4 in Case No. 2023-00312 was incorrectly accrediting solar above 50% due to the ELCC Curves, while the IRP Model was correctly limiting it to 80 MWs or 50% accreditation.

For Winter PY25-26, we have a variance because the response to PSC 1-4 in Case No. 2023-00312 was limiting solar to 5% accreditation[2] in the winter, which is the updated limit; conversely, the IRP model was using the earlier assumption of 50%.[3]

There is a variance on OMU + KYMEA, as the IRP Model has OMU ending in [redacted] The OMU contract ends on [redacted]

We have another small variance on Load for PY29-30 forward, which is related to auxillary usage on the Green units once they are retired. This is captured in the IRP Models, but not in the

[2] https://cdn.misoenergy.org/2023%20Wind%20and%20Solar%20Capacity%20Credit%20Report628118.pdf
[3] https://cdn.misoenergy.org/2022%20Wind%20and%20Solar%20Capacity%20Credit%20Report618340.pdf

response to PSC 1-4 in Case No. 2023-00312. This is causing both BREC Delivered Peak and BREC Delivered Peak + Reserve Margin to be slightly higher in the IRP Model.

Witness: Terry Wright & John Christensen (1898 & Co.)

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REQUEST NO. 1-25: ***Refer to the IRP, Section 7, page 113.***

a. Confirm that modeling the new natural gas combined cycle (NGCC) being modeled on a capacity block basis means that each capacity block represents a different sized combined cycle unit made available to the model. If not, explain what the different blocks represent.

b. Refer also to the IRP, Section 7, page 116. Explain how the new 635 MW NGCC can be modeled in different capacity blocks.

RESPONSE: Please refer to Table 7.1.4(c) on Page 115. Combined Cycle power plants have different average heat rates at varying levels of generation output. The aforementioned heat rates and generation levels are impacted by seasonal temperature and humidity levels. The Table on Page 115 outlines the relationship between generation loading level and heat rates across the calendar year in the modeling. The model was never allowed to select a partial-sized combined cycle unit.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-26: ***Refer to the IRP, Section 7, page 115.***

a. Explain why EnCompass was only allowed to select portfolios that retired the two Green units in 2029 and replaced them with a 635 MW NGCC unit; or portfolios that continued operating the Green units for another 20 years. Include in the explanation why it is necessary for the units to be either run or retired together.

b. Explain what the modeling results would be if the Green units were allowed to be retired and replaced with the 635 MW NGCC dynamically in any year.

RESPONSE:

a. The EnCompass model was configured to allow for the selection of retirement of the Green units in 2029 and for the addition of any of the generic resources to be selected for energy and capacity in multiple years starting around the same timeframe. The selection of the BREC CC unit was not tied to the retirement of the Green Units in the EnCompass modeling as can be seen by the selections in Table 7.2.3(a), where under the Low Gas sensitivity the model selected combustion turbines in 2029 and 2030. Retiring one unit would increase the costs of the other, making it even less economic.

b. As outlined on Page 115 of the IRP, the Green Units were modeled as either retired in 2029 or given a life extension to 2043. Providing the model with the opportunity to retire a unit(s) in any year creates significant data and computational challenges with limited value in this case. The Green Units were not shown to be providing significant energy by the end of the decade in the modeling, but they remained

capacity resources until retirement. It was most economical for the power supply to acquire a modern fuel-efficient natural gas plant to replace the Green Units capacity while also providing energy as soon as possible within the confines of interconnection, permitting, and construction of an alternative facility.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-27: ***Refer to the IRP, Section 7, page 116. Provide the overnight capital costs and other relevant operating characteristics of the different technologies made available to the EnCompass model and the source of the information.***

RESPONSE: The assumptions used in the EnCompass model for the generic resources can be found in Section 7.1.4, starting on Page 113 of the IRP. Please see Table 7.1.4(j) on Page 124 of the IRP for the Overnight Capital Costs, Variable O&M, and Fixed O&M costs. Please see Table 7.1.4(a) on Page 114 of the IRP for the operating characteristics.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-28: ***Refer to the IRP, Section 7, Table 7.1.4(e), page 118. Provide an update to the table to include the two Green units and the Reid unit.***

RESPONSE: Table 7.1.4(e) on Page 118 of the IRP excludes Green 1, Green 2, and Reid, because these three units do not have a Variable O&M adder included in the EnCompass modeling. Consequently, it does not make sense to make the requested update.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-29: ***Refer to the IRP, Section 7, page 119.***

a. Explain whether the wind and solar facilities are assumed to be located in BREC's service territory. If yes, provide the underlying studies and any other support (including National Oceanographic and Atmospheric Administration (NOAA) wind studies if available) to justify locating up to 700 MW of viable wind generation in BREC's service territory.

b. Explain whether BREC is aware of any utility scale wind generation within its service territory. If so, provide the location of the facility.

c. Explain why wind and solar power purchase agreements (PPAs) were not considered as alternatives.

d. Explain whether BREC is still looking to provide solar energy to any specific industrial customers to make up for previously canceled solar projects and, if so, why this additional renewable resource was not included in the IRP.

RESPONSE:

a. The generic wind and solar resources modeled in the IRP were assumed to be in MISO Load Resource Zone 6 and were not limited to the Big Rivers' service territory. It is also possible that wind and/or solar resources could be procured in other MISO Load Resource zones, but that would come with increase price basis risk and a potential challenge of importing the accredited capacity into MISO LRZ 6 for use by Big Rivers in meeting its obligations under the MISO Resource Adequacy construct.

b. Big Rivers is not aware of any utility scale wind generation within its service territory.

c. Big Rivers ran scenarios in the model where wind and solar was selected. However, Big Rivers previously sent out an All-Source Request for Proposals, and the wind and solar purchase power agreements received were not economical compared to the Natural Gas Combine Cycle Plant.

d. Big Rivers is not still looking to provide solar energy to any specific industrial customers to make up for previously canceled solar projects.

Witness: Nathanial A. Berry

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REQUEST NO. 1-30: ***Refer to the IRP, Section 7, Table 7.1.4(h), page 121.***

a. Explain how the effective load carrying capability (ELCC) for solar can be 50 percent across the seasons for 2023-2025.

b. Explain how the solar ELCC can be 50 percent for fall and winter in 2025 and then only 6 percent and 1 percent respectively for 2026.

c. Refer also to the IRP, Section 7, page 120. Since BREC modeled a 100 MW solar and 50 MW 4-hour battery storage system as a paired resource, explain whether the ELCC for the pair is the same as the ELCC for the individual components.

RESPONSE:

a. MISO's current methodology for the accreditation of new solar resources is to apply a 50% nameplate calculation for the first year of operation. In subsequent years, the accreditation is based on performance during peak hours, but is often around 50% annually. MISO recently transitioned to a seasonal construct for Planning Year 2023/24. At the time of this analysis, MISO has yet to publish a change in methodology for solar resources under the new seasonal construct.

b. Starting with the Summer 2026 season, BREC assumed that MISO would implement an ELCC-based accreditation methodology for new and existing solar resources, similar to what it currently does for wind resources in the footprint. The reduction in ELCC accreditation in the subsequent seasons is based on some preliminary work done by MISO on this topic; that information is included at slide 21 of the document linked in subpart c, below.

c. During this analysis, MISO hasyet to provide guidance on future ELCCs for paired or hybrid resources. The modeling was set up to treat the individual components of a hybrid resource the same as the standalone equivalents. *See* **https://cdn.misoenergy.org/20230117-18%20RASC%20Item%2014b%20Non-Thermal%20Resource%20Accreditation%20(RASC-2020-4,%20RASC-2019-2)%20Presentation627472.pdf**

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-31: ***Refer to the IRP, Section 7, page 130; and Table 7.1.5(a), page 131.***

a. Explain the difference between the numbers in the table and the narrative description on page 130.

b. Explain whether the numbers in the table mean that the "$/kWseason" are the same for all seasons.

c. Explain whether the (cost of new entry) CONE for Zone 6 has been constant historically. If not, explain why it is reasonable for the CONE to be held constant over the forecast horizon.

d. Explain the generation technology upon which the CONE for Zone 6 represented in Table 7.1.5(a) is based.

RESPONSE:

a. The number cited in the text is a calculated seasonal price based on the PY2022/2023 MISO CONE calculation. The values in Table 7.1.5(a) represent seasonal CONE costs in Real 2024 dollars. The text on page 130 of the IRP stating "Table 7.1.5(a) shows the nominal..." should read "Table 7.1.5(a) shows the real cost of capacity in 2024 dollars....

b. The cost of capacity is assumed to be the same in all four seasons of the Planning Year.

c. The values presented in Table 7.1.5(a) are shown in real dollars and do not factor in general escalation assumptions. The nominal values used in the modeling are subject to escalation.

d. MISO bases the CONE calculation on an advanced combustion turbine; please see slide number 4 of the MISO presentation linked in footnote 80 on page 130 of the IRP.

Witness: John Christensen (1898)

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REQUEST NO. 1-32: ***Refer to the IRP, Section 7, page 133. BREC states that all coal and natural gas fired units were modeled as economically committed. Explain whether this is the manner in which the units are always committed to the market. If not, explain the rationale for the simplifying assumption.***

RESPONSE: The MISO market commits all generators based on the bids submitted by market participants. The EnCompass model was configured to dispatch all the BREC units against the forecasted LMP for each resource in order to mimic the interactions with the MISO market as closely as possible in the IRP.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-33: ***Refer to the IRP, Section 7, Table 7.1.6, page 133; and Section 2, Table 2.2.8(a). Reconcile the differences in coincident peak (CP) between the two tables.***

RESPONSE: See Big Rivers' response to PSC 1-9.

Witness: Terry Wright, Jr.

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REQUEST NO. 1-34: ***Refer to the IRP, Section 7, Tables 7.2.1(a), page 135; and Table 7.2.1(b), page 136. Explain the rationale for constraining the PACE solar plus storage project (PACE Project) to be made available to the EnCompass model in year 2028 and why the model was not allowed to add additional increments in subsequent years.***

RESPONSE: The PACE Project was modeled as a standalone project due to the unique timing and financing opportunity presented by the New ERA funding requested through the Rural Utilities Service. The EnCompass model was allowed to select additional solar and storage projects in future years without the incentive financing**,** but in the end did not find them economical.

Witness: John Christensen (1989 & Co.)

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REQUEST NO. 1-35: ***Refer to the IRP, Section 7, Table 7.1.4(i), page 122, indicating that solar has a capital and fixed O&M cost advantage over onshore wind. Refer also to the IRP, Section 7, page 141, indicating that the EnCompass model did not select solar as an individual resource in either the Base Case or any of the scenarios listed on that page. Explain why the model never selected solar as a standalone resource.***

RESPONSE: The Capital and Fixed O&M costs provided in Table 7.1.4(i) are "before applicable tax credits" figures. While solar does appear cheaper than wind based on this table, the full economic performance of these resources includes tax credits and annual energy production. Annual capacity factors associated with the generic wind and solar resources were estimated at approximately 28% and 21%, respectively. This difference in energy production for solar coupled with the tax credits results in poor economic performance against projected market LMPs, resulting in the model not selecting additional solar resources.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-36: ***Refer to the IRP, Section 7, page 140. Explain the rationale for selecting a 635 MW natural gas combined cycle unit as a potential replacement resource for the two green units that have a combined capacity of only 454 MW.***

RESPONSE: As mentioned in response to PSC 1-32, the EnCompass model was configured to mimic the behavior of the MISO market as much as possible. Replacing the capacity on a seasonal basis from Green Units 1 and 2 (post-retirement) is part of the economics problem the model is seeking to optimize. While the model had the option to replace the Green units with other resource types, when factoring in the market energy value, the model found the replacement of 454 MW of out-of-market generation with 635MW of fuel-efficient generation to be the least cost option.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-37: ***Refer to the IRP, Section 7, Table 7.2.3(a), page 141. Provide an update to the table showing BREC's current unit generation capacity, BREC's seasonal reserve margins currently, and BREC's expected seasonal reserve margins in each of the scenarios in the table.***

RESPONSE: Please see the attached CONFIDENTIAL Excel workbook. The data requested in this IR is difficult to format into Table 7.2.3(a). Big Rivers has provided all the information requested in tabular form for each season and each of system capacity, peak load plus planning reserve margin, and surplus/deficient capacity.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-38: ***Refer to the IRP, Table 7.2.3(a), page 141.***

a. ***State why DSM Program is selected under some but not all scenarios.***

b. ***State which DSM programs are included in these scenarios.***

c. ***State whether demand response programs are included as part of DSM programs in these scenarios. If not, state whether they are included as a factor in load forecast.***

RESPONSE:

a. The DSM programs were analyzed using the EnCompass capacity expansion software. Table 7.2.3 (a) is a summary of resource alternatives (including the DSM program) that were selected under each of the seven sensitivities. The DSM program was selected in scenarios where it was identified as an economical source of energy and/or capacity.

b. Please refer to section 2.6.4, Program Potential, in Appendix B, pages 2-12. As stated there:

> "For the purposes of this study, one program budget scenario was developed. This scenario was based on a budget of $1 million. It is important to note that the budget assumptions and the savings estimates for the program potential savings are hypothetical scenarios only. Rather than selecting a specific set of programs for this

analysis, it was assumed that all the measures from the achievable potential would be available.

The cumulative achievable savings for the existing and new member end-users was developed using an age-replacement method. Savings were assumed to accrue based on a replacement rate as appliances and equipment wear out and are replaced by new, efficient equipment. This was calculated on an end-use basis by assuming a regular replacement based on the end-use measure life taken from the multi-perspective measure models and applying that over the study window.

The budget cost of acquiring the end-use program savings was developed by multiplying the program MWh by the $/MWh measure cost derived from the multi-perspective evaluation models. An adoption factor based on the percentage of survey respondents who indicated they did not intend to adopt energy efficient measures and a budget factor were then used to scale the total cost up or down to match the $1 million program-level budget each year."

c. Demand response programs are currently not included in the DSM program scenario developed by Clearspring Energy. They are also not included as a factor in the load forecast developed by Clearspring Energy. Demand response programs require extensive

downstream work before implementation, and it would be premature to include them as Big Rivers is still evaluating their system fit.

Witnesses: **John Christensen (1898) (for part a)**

Joshua Hoyt (Clearspring) (for parts b and c)

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REQUEST NO. 1-39: ***Refer to the IRP, Section 7, page 120; pages 141-143; and Table 7.4.1(b), page 153.***

a. Even though the PACE Project was considered uneconomic in most initial resource assessment portfolio scenarios, explain why the PACE Project was not included as an already completed project in the resource selection modeling since BREC's analysis appears to show that it intends to move ahead with the project.

b. Confirm that BREC intends to construct, own, maintain and operate the PACE Project.

c. Explain how the PACE Project will reduce transmission congestion and provide increased resilience along the MISO/TVA seam.

RESPONSE:

a. Due to the timing of IRP model development and the NewERA application process, several critical assumptions regarding the PACE project were unavailable in time and with enough certainty to be modeled as a base case resource.

b. Big Rivers would expect to construct (or have constructed), own, operate, and maintain the PACE project.

c. The generation included in the PACE project would be constructed near existing Big Rivers load that is located on a MISO/TVA seam. With generation in much closer proximity to the load, power flows necessary to supply that load on the regional transmission grid are expected to be reduced.

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FIRST REQUEST FOR INFORMATION

Witnesses: **Erin Murphy (subpart a)**

Christopher S. Bradley (subparts b & c)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-40: ***Refer to the IRP, Section 7, page 120 and pages 142-143.***

a. Explain when BREC submitted the request to study the PACE Project to MISO.

b. Explain when BREC submitted its application for the full $100 million loan amount for the PACE Project and the current status of the loan application. Include in the response a copy of BREC's loan application.

RESPONSE:

a. Big Rivers has not submitted a request to MISO to study the PACE Project.

b. Big Rivers submitted a Letter of Interest (LOI) on July 10, 2023 for its PACE Project. On December 6, 2023, Big Rivers received an Invitation to Apply for the full $100 million loan amount for the PACE Project. Big Rivers is in the process of preparing the full loan application.

Witness: Erin M. Murphy

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
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REQUEST NO. 1-41: ***Refer to the IRP, Section 7, Table 7.2.3(a), page 141. Refer also to the IRP, Appendix A, page 54.***

a. Explain whether the Low Load and High Load scenarios presented in Table 7.2.3(a) are consistent with the Low economic growth with normal weather and High economic growth with normal weather load forecast scenarios in the Appendix. If not, explain why not.

b. Explain whether the Encompass model consistently selected the retirement of both Green units because their current depreciation schedule has them fully depreciated in 2029. Include in the response whether the model will continue to operate a unit that is fully depreciated and, if so, under what circumstances.

c. Explain whether the modeling option to let the Green units and the Reid unit run for an additional 20 years necessitated altering the depreciation schedules accordingly.

RESPONSE:

a. Please refer to Table 7.2.3(a) on Page 141 of the IRP. The Low Load and High Load sensitivities are consistent with the Low Economic Growth with Normal Weather and High Economic Growth with Normal Weather scenarios in Appendix A.

b. The EnCompass model considers the economic benefits of keeping a facility. The remaining costs to be recovered (depreciated) are only one factor in the economic decision-making process the model considers; simply because a unit is fully depreciated does not mean the unit must be retired under the model. Indeed, the EnCompass model did not choose to retire the Green

units because they were depreciated in 2029, but because the expense of keeping the facility operational was greater than the economic benefits of replacement.

c. Depreciation schedules were not altered to let the Green and Reid units run for an additional 20 years.

Witnesses: John Christensen (1898 & Co.) (for subparts a and b)

Christopher A. Warren (for subpart c)

IN THE MATTER OF:
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REQUEST NO. 1-42: ***Refer to the IRP, Section 7, pages 144. Explain why the Wilson and new NGCC units are retrofitted with CCS technology and not the Reid CT.***

RESPONSE: CCS technology is modeled for the Wilson unit because Big Rivers has submitted a Letter of Intent (LOI) in the New ERA Program for funding that technology. The new NGCC unit is modeled with CCS because Big Rivers anticipates any new fossil generator may be required to have such technology available to gain necessary regulatory approvals for construction. Reid CT was not selected for CCS technology in 2032 due to its' expected low service hours making the economics unfavorable.

Witness: Nathanial A. Berry

IN THE MATTER OF:
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REQUEST NO. 1-43: ***Refer to the IRP, Section 7, pages 145. Explain why the Wilson unit and not the new NGCC unit is eligible for financing and grant incentives.***

RESPONSE: Big Rivers has submitted a Letter of Interest (LOI) for the New ERA Program, the scope of which includes Carbon Capture and Sequestration technology. The Wilson project meets the funding criteria for the New ERA program while also achieving a 47.9% greenhouse gas (GHG) reduction. While the NGCC unit may be eligible for financing and grant incentives, it is not presently known whether the project will meet future funding criteria, and such technology would not yield as significant GHG reduction as the Wilson unit.

Witness: Erin M. Murphy

IN THE MATTER OF:
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REQUEST NO. 1-44: ***Refer to the IRP, Section 7, pages 145.***

a. ***Explain the rationale and basis for the carbon transportation and storage costs.***

b. ***Explain the basis for the 45Q tax credits.***

RESPONSE:

a. Carbon transportation and storage costs are based on the Environmental Protection Agency's transportation and storage cost estimator. Please see:

www.epa.gov/system/files/documents/2023-03/Attachment%206-1%20CO2%20Reduction%20Retrofit%20Cost%20Development%20Methodology%20in%20EPA%20Platform%20v6%20Post-IRA%202022%20Reference%20Case.pdf

b. The basis for the 45Q tax credits is located within Section 45Q of the United States Tax Code. The $85/Ton credit can be found on Form 8933, Page 3 (10a) located at https://www.irs.gov/pub/irs-pdf/f8933.pdf.

Witnesses: Erin M. Murphy (for subpart a)
Talina R. Mathews (for subpart b)

IN THE MATTER OF:
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REQUEST NO. 1-45: ***Refer to the IRP, Section 7, Table 7.3.1(a), page 143; and Table 7.3.2(a) page 146. Given the capacity penalty of carbon capture and that the optimal operation hours and characteristics (economic dispatch) of the Wilson and NGCC units versus the additional wind resources do not match, explain how the wind resources fully compensate for the loss of capacity due to carbon capture, especially when BREC's load is near or at seasonal coincident peaks.***

RESPONSE:

The generic wind resource additions in the Aggressive Carbon Reduction Portfolio are used to supply enough capacity to meet Big Rivers' obligations under MISO's Resource Adequacy requirements. The accredited capacity lost due to the addition of carbon capture technology on Wilson and the NGCC is not "recovered" on a one-for-one basis with the amount of generic wind additions included in the Portfolio, but Big Rivers' long-term projection of capacity position in the winter season is neutral with the addition of the generic wind. In order to be neutral significantly more nameplate generic wind was required compared to the accredited capacity received due to the limited value wind statically provides on peak which MISO factors into its ELCC values[1]. Please see Figure 7.4.3(b) on Page 161 of the IRP.

[1] https://cdn.misoenergy.org/2023%20Wind%20and%20Solar%20Capacity%20Credit%20Report628118.pdf

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Witness: John Christensen (1898 & Co.)

IN THE MATTER OF:
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REQUEST NO. 1-46: ***Refer to the IRP, Section 7, Figure 7.4.1(a), page 150. Provide BREC's Base Case capacity position for all four seasons including each generation technology in excel format with all cells visible and unprotected.***

RESPONSE:

Please see the CONFIDENTIAL Excel workbook provided with this response, which is filed subject to a motion for confidential treatment.

Witness: John Christensen (1898 & Co.)

IN THE MATTER OF:
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REQUEST NO. 1-47: ***Refer to the IRP, Section 7, Figure 7.4.1(a), page 150; and Figure 7.4.1(b), page 151.***

a. Explain the reasons for the increase in coal generation capacity from 2026 to 2027 and then again from 2029 to 2030, where it remains constant for the rest of the forecast horizon.

b. Confirm that the dotted line represents BREC's modeled peak plus its MISO PRMR.

c. Explain why it is reasonable to model and plan to maintain up to 400 MW of excess capacity in the summer and 228 MW of excess capacity in the winter.

RESPONSE:

a. The accredited capacity position of Wilson Station shown in the referenced figures is net after reductions for off-system sales of capacity. These non-member capacity sales roll off from 2026 to 2029, and Wilson Station is held at its long-term firm capacity level through the remainder of the study.

b. The dashed or dotted line is Big Rivers' Member-Owner load grossed up for the Seasonal Planning Reserve Margin Requirement.

c. This modeling is reasonable due to uncertainty related to timing, cost and resource accreditation, uncertainty around non-member firm sales extensions, and uncertainty around load growth from new economic development or electrification of transportation. Generation planning

is a long-term process involving coordination among many complex stakeholders and timelines. Advancing a resource through the MISO Interconnection queue requires several years of lead-time with potential costs for interconnection uncertain until near the end of the process. The request for suspension or retirement of a resource is a shorter process, but it also entails a risk of being deemed a system support resource.

Between interconnection and retirement, generator operators must qualify those resources for capacity accreditation, and MISO only recently adopted seasonal accreditation (SAC) based largely upon the generators' availability during MISO's tightest hours of each of the previous three-years for each season. SAC is not a static value and is constantly changing based on MISO's annual Planning Resource Margin adjustments, unit performance during Tier 2 Hours, and MISO Tariff changes, such as the proposed changes to solar accreditation, which have not yet been finalized or filed with FERC for approval. In addition, Planning Reserve Margins are changing on an annual basis for each of the seasons, so there is the risk that Planning Reserve Margin Requirements could increase, which would cause Big Rivers to need additional capacity. Excess capacity can be used to meet extended non-Member sales; it can also be offered for bilateral sale or to MISO, which would make that excess eligible for energy dispatch, thereby bringing additional value to Big Rivers' Member-Owners. Finally, excess capacity could be used to cover

Reid Station or even some of Wilson Station if the SAC of those resources is affected by performance in a future planning year.

Witnesses: **John Christensen (1898 & Co.) (for subparts a and b)**

Nathanial A. Berry (for subpart c)

IN THE MATTER OF:
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REQUEST NO. 1-48: ***Refer to the IRP, Section 7, Table 7.4.1(a), page 152. To the extent BREC's non-member load applies to its MISO PRMR, explain whether that load is included in BREC's capacity position. If not and MISO considers that load should be counted toward BREC's PRMR, then update the table to show both BREC's capacity position with and without non-Member load.***

RESPONSE:

The non-member capacity obligations were modeled as Firm Capacity sales to be transferred as zonal resource credits to the counterparty as a transaction using the MISO MECT; thus, Big Rivers' non-member load is included in Table 7.4.1(a) values.

Witness: John Christensen (1898 & Co.)

IN THE MATTER OF:
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REQUEST NO. 1-49: ***Refer to the IRP, Section 7, page 133; and Table 7.4.1(a), page 152.***

a. Explain whether the table represents BREC's forecast PRMR net of its seasonal MISO PRMR.

b. Explain the implications of the new seasonal PRMR. For example, BREC is below the seasonal PRMR for two seasons, explain what short term and long term actions, if any, would MISO require BREC to take.

RESPONSE:

a. Table 7.4.1(a) represents BREC's forecasted fleet accredited capacity position relative to Big Rivers' forecasted obligations, including the seasonal PRMR.

b. When Big Rivers' Seasonal Accredited Capacity falls short of its seasonal Planning Reserve requirement, the capacity needed to satisfy Big Rivers' PRMR must be acquired either bilaterally or in the Planning Reserve Auction. Though not required by MISO, if the shortage is anticipated to be persistent, Big Rivers will evaluate the need for additional resources.

Witnesses: **John Christensen (1898 & Co. for subpart a)**

Terry Wright, Jr. (for subpart b)

IN THE MATTER OF:
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REQUEST NO. 1-50: ***Refer to IRP, Table 7.4.1(a), page 152. State how BREC plans to address the capacity shortfall relative to MISO reserve margins for the summers of 2025 and 2026 and the winters of 2024 through 2027.***

RESPONSE: When Big Rivers' Seasonal Accredited Capacity falls short of its seasonal Planning Reserve requirement, we will purchase capacity either bilaterally or in the Planning Reserve Auction.

Witness: Terry Wright, Jr.

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REQUEST NO. 1-51: ***Refer to the IRP, Section 7, Table 7.4.1(b), page 153. Provide an update to the table showing the seasonal capacity by fuel type on the same basis as would be used to satisfy BREC's MISO PRMR. If not provided elsewhere, also provide the corresponding ELCC values.***

RESPONSE:

Please see the Excel workbook provided with this response. Please refer to Table 7.1.4(h) for the ELCC values used in the capacity positions.

Witness: John Christensen (1898 & Co.)

IN THE MATTER OF:
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REQUEST NO. 1-52: ***Refer to the IRP, Section 7, page 156, in which BREC states that it does not consider wind to be economically feasible, because there were no wind resources proposed in its recent all source RFP; the intermittent operation of wind remote to BREC's load brings the risk of congestion costs which are hard to quantify or hedge; and some hours are extremely long at times of low market prices and others are short when prices are high. Refer also to the IRP, Section 7, page 125, indicating that BREC omitted certain other potential generation resources from the analysis on the basis of high cost and market readiness but indicating that wind was included to retest BREC's 2020 IRP windrelated assumptions.***

a. Further explain BREC's reasoning for the inclusion of wind resources at any stage in the IRP modeling.

b. In all stages of the IRP modeling and analysis, explain the value of any portfolio that relies upon wind to provide capacity and/or energy.

RESPONSE:

a. Since the previous IRP was developed and filed, the United States government extended and expanded the Production Tax Credit for energy generated by renewable energy resources, including wind. As stated in the current IRP, qualitatively Big Rivers does not believe that wind resources are in the best interests of its Member-Owners. In order to ensure robust analysis and quantitatively support its position, Big Rivers included generic wind resources in the

modeling to demonstrate the shortfalls that would need to be resolved in alternate portfolios by other commercially available generation technologies.

b. The analysis presented in this IRP demonstrates that generic wind resources do not provide enough value for inclusion in the preferred action plan at this time.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-53: ***Refer to the IRP, Section 7, Table 7.2.3(a), page 141; Table 7.3.1(a), page 143; and page 156.***

a. All else being equal, rerun the EnCompass model allowing it to retire the Green units and to add the NGCC unit in any year, to add the PACE Project in any year and in multiple increments; and without wind generation as a potential resource option.

b. Provide and compare the subsequent results to the scenario runs presented in the IRP, Table 7.2.3 (a), page 141; and Table 7.3.1(a), page 143.

RESPONSE:

a. Big Rivers cannot run the requested scenario due to the infeasibility of the requested assumptions. However, the Base Case modeled in this IRP is very similar to the requested analysis. Big Rivers does not have projections developed for ongoing O&M costs related to Green Units 1 and 2, assuming the unit could retire in any year, and developing those projections is a laborious and time-consuming undertaking. Further, Big Rivers is unable to pursue more than one PACE Project at the attractive terms potentially offered by the Rural Utilities Service through New Era funding. Due to timing constraints on spending the potential New Era money and the length of time required to obtain a transmission interconnection, Big Rivers will only be able to pursue, at most, one PACE Project around the 2028 timeframe. Big Rivers did allow the model to select additional generic solar and storage projects in the IRP at non-incentivized financing rates

throughout the modeling horizon. In the existing modeling, the BREC NGCC was allowed to be selected in any year starting in 2029.

b. Please see response to a., above.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-54: ***Refer to the IRP, Section 7, Figure 7.4.2(a), page 157; and Figure 7.4.2(b), page 158. Explain the reasons for coal generation capacity increases from 2026 to 2027 and then again from 2029 to 2030, where it remains constant for the rest of the forecast horizon.***

RESPONSE: The capacity position of Wilson shown in the referenced figures is net of off-system non-member capacity sales. These contracts roll off from 2024 to 2029. In the Aggressive Carbon Reduction (ACR) Portfolio, the capacity position of Wilson is reduced starting in 2032 due to CCS equipment implementation.

Witness: John Christensen (1898 & Co.)

IN THE MATTER OF:
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REQUEST NO. 1-55: ***Refer to the IRP, Section 7, Figure 7.4.3(a), Figure 7.4.3(b), and Figure 7.4.3(c), pages 159-161.***

a. Figure 7.4.3(a) and Figure 7.4.3(b) show coal generation capacity remaining constant from 2032-2050 even though the Q45 tax credits expire in 2044. If the Wilson unit does not dispatch after 2044, explain whether the unit is considered available for MISO PRMR purposes, but not consuming coal after 2044.

b. Explain why the amount of forecasted natural gas generation does not appear to have diminished post 2032 in Figure 7.4.3(c) if the capacity factor of the NGCC unit falls by 87 percent after 2032 when the CCS technology is implemented.

RESPONSE:

a. The energy produced by a unit does not impact the capacity position of the unit. The Wilson unit does not dispatch economically following expiration of the 45Q tax credit, but it would still be available in the MISO market to produce energy and count toward meeting Big Rivers' obligations under the MISO Resource Adequacy requirements.

b. As stated at pages 159-160, the NGCC capacity factor falls by approximately 87% after the expiration of 45Q Tax Credits expiration, starting in 2044 (rather than 2032).

Witness: John Christensen (1898 & Co.)

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REQUEST NO. 1-56: ***Refer to the IRP, Appendix A, pages 13-14. Explain whether the IRP analysis is based on a 20-year or 30-year average for cooling degree days (CDD) and heating degree days (HDD).***

RESPONSE: The IRP analysis is based on a 20-year average for cooling degree days and heating degree days.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
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REQUEST NO. 1-57: ***Refer to the IRP, Appendix A, page 17.***

a. Explain how the historical contribution of electric vehicles (EV) for Residential and General Commercial and Industrial (GCI) classes was isolated out of energy use and peak load.

b. Explain the Energy Information Administration (EIA) region which includes BREC.

c. Explain the data and variables used to obtain EIA projections.

d. Define and explain what "Percent of Daily EV Charging" represents on the graph titled Electric Vehicle Load Shape on page 17 of Appendix A.

RESPONSE:

a. Kentucky statewide EV registration data was gathered for each of the historical years. EV's were allocated to the distribution Members based on population served. In total, the distribution Members received roughly a 5% allocation of total Kentucky EVs. EV counts were then converted to kWh values using energy per electric vehicle data from the EIA. Residential and commercial energy splits were obtained by the Department of Energy Alternative Fuels Data Center to further break out the annual energy figure into each retail class. Peak contributions were then derived from the annual energy values by mapping daily load shapes to the historical peak times to calculate an estimated peak contribution for each month.

b. The EIA region is "East South Central" and contains Kentucky, Tennessee, Mississippi, and Alabama.

c. The EIA employs the National Energy Modeling System (NEMS) in developing the projections. A report on the model documentation of the NEMS specific to the transportation sector demand module is provided at the following link: A Transportation Sector Demand Module of the National Energy Modeling System: Model Documentation (eia.gov).

d. The figure is a daily load shape. It shows the percent of total daily charging allocated to each hour of the day. The sum of each hourly percentage equals 100%. The daily load shape is used in allocating peak contributions from total energy values.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
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REQUEST NO. 1-58: ***Refer to the IRP, Appendix A, page 18.***

a. Explain the distributed generation (DG) technologies that are present in BREC's service territory for the Residential and GCI classes.

b. Define and explain what "Percent of Daily Generation" represents on the graph titled Distributed Generation Load Shape on page 18 of Appendix A.

c. Explain whether there is any other behind-the-meter generation that is not counted as DG. If so, explain how these amounts are included in BREC's forecasts.

RESPONSE:

a. DG technologies have historically been emergency/back-up generation for residential and GCI retail members. In recent years, solar generation has grown from 1,500 kW (dc) in 2018 to 8,300 kW in 2022; it is likely to exceed 10,000 kW this year.

b. The figure is a daily load shape. It shows the percent of total daily generation allocated to each hour of the day. The sum of each hourly percentage equals 100%.

c. Big Rivers is unaware of any behind-the-meter generation that would not be counted as DG among residential or CGI retail members.

Witnesses: **Russell L. Pogue (subparts a and c)**

Matt Sekeres and Steve Fenrick (Clearspring) (subpart b)

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REQUEST NO. 1-59: ***Refer to the IRP, Appendix A, page 25, in which BREC states that during the last 15 years of the forecast there will be a continuing decrease in the real cost of electricity.***

a. Explain whether this assumes that carbon regulation technology is not implemented in 2032.

b. Explain the driving factors that contribute to the declining real cost of electricity.

RESPONSE:

a. The electricity price is a combination of EIA's electricity price projections and Big Riverss internal projections. Both sources reveal a decrease in the real cost of electricity. Detailed information on the EIA modeling approach can be found in this report: Electricity Market Module of the National Energy Modeling System: Model Documentation 2022 (eia.gov). Given that the Electricity Market Module (EMM) of the National Energy Modeling System attempts to estimate the actions taken by electricity producers (including electric utilities), it is possible that those estimates include some level of carbon regulation technology. The rate projections provided by Big Rivers for the first 15 years of the forecast do not include carbon regulation.

b. The EMM is an iterative and complex forecasting system. It accounts for several factors and includes the submodules of capacity planning, fuel dispatching, finance and pricing, and electricity load and demand. In examining the capital, O&M, and fuel costs of producing, transmitting, and delivering electricity along with the energy and demand projected for consumers, the EMM has determined that electricity prices will not increase as much as inflation.

The driving factors that contribute to a decline in the real price of electricity for Big Rivers' internal projections include:

- The economic development rates expiring, so those customers share more of the costs.
- A more efficient NGCC in operation.
- After the regulatory assets are fully amortized, rates receive 100% of the margins over 1.30 TIER as bill credits.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
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REQUEST NO. 1-60: ***Refer to the IRP, Appendix A, pages 49-50. To the extent that BREC is generating power for the benefit of its non-members during the time it is experiencing a system CP, explain why that portion of non-member generation should not be added to the BREC system CP.***

RESPONSE: As a MISO member, Big Rivers offers its generation to the energy market pursuant to the terms of the MISO Tariff. It is MISO's economic unit commitment and dispatch algorithms which determine the usage of Big Rivers' resources every hour, whether Non-Member sales are occurring or not. As capacity is not the same as energy needs, the committed capacity as well as generation is being utilized for the benefit of our Members, whether our Non-Members choose to schedule over the peak or not. While the Annual CP in Appendix A page 50 only includes the Big Rivers peak, non-Member load is included as a Big Rivers obligation via Zonal Resource Transactions in the MISO Module E Capacity Tracking Tool (MECT), and was included in the IRP analysis described in Chapter 7 of this IRP.

Witness: Terry Wright, Jr.

IN THE MATTER OF:
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REQUEST NO. 1-61: ***Refer to the IRP, Appendix A, page 54. Explain why further scenarios were not run with low economic growth and extreme weather and high economic growth with mild weather as benchmarks.***

RESPONSE: The four scenarios that Clearspring explored (extreme weather with normal economic, mild weather with normal economic, high economic with normal weather, and low economic with normal weather) are the same scenarios provided in the prior IRP. Those scenarios conform to the expectations of the United States Department of Agriculture when rural cooperatives file load forecasts, and they are Clearspring's standard set of scenarios for our load forecasting clients. The four provided scenarios enable the impact of extreme/mild weather and the impact of high/low economic growth to be isolated against the base economic or weather assumptions. By changing multiple variables at once, such as high economic growth with mild weather, the impacts of each changed variable are not isolated and cannot be evaluated by the reader.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

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REQUEST NO. 1-62: ***Refer to the IRP, Appendix A, pages 54-59. Explain whether the NonMember contract obligations are fixed, such that regardless of economic or weather variations, BREC's obligations in terms of capacity and energy do not change.***

RESPONSE: Big Rivers' Non-Member contract obligations are varied. In the case of KYMEA, the customer can choose whether to schedule a purchase from Big Rivers, based on economics or weather, or any other reason. Both the OMU and Nebraska contracts contain fixed obligations, subject to certain contract terms including force majeure clauses.

Witness: Terry Wright, Jr.

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S
FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-63: ***Refer to the IRP, Appendix A, pages 96-107. Confirm that the monthly variables January through December are binary variables used across the various regressions.***

RESPONSE: Confirmed.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-64: ***Refer to the IRP, Appendix A, pages 97-98.***

a. Define and explain the January 1999-July 2015 variable.

b. Define and explain the 2019 Forward variable.

RESPONSE:

a. This is a binary variable to capture likely account reclassifications that occur between retail classes on a distribution Member-Owner's system.

b. Same answer as (a), above.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-65: ***Refer to the IRP, Appendix A, page 99. Define and explain the April Cold Peaking, April Hot Peaking, October Cold Peaking and October Hot Peaking variables. Include in the response whether the variables are defined similarly for all three Distribution Members.***

RESPONSE: April and October are shoulder months that can have their monthly peak hour occur either due to cold weather or due to warm weather. The variables are binary variables that indicate if the monthly peak occurred due to cold weather (designated as "cold peaking") or due to hotter temperatures (designated as "hot peaking"). These variables are defined similarly for all three distribution Member-Owners.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-66: ***Refer to the IRP, Appendix A, page 100.***

a. Explain the source of the AC saturation and the Electric Heat Saturation variables.

b. Define and explain the Residential Price and Alternative fuel Price variables. Include in the response whether the variables are defined similarly for all three Distribution Members.

RESPONSE:

a. The source of the AC saturation and Electric Heat saturation variables are the residential surveys conducted by Big Rivers. Surveys from 2007 to 2022 are used in the construction of the variables.

b. The residential price is the electricity price paid by the residential retail consumers of the distribution Member-Owners after adjusting for inflation. This makes the Residential Price variable to the "real" retail price. The Alternative Fuel Price is a weighted-average real price of the alternative fuels of natural gas and propane. The weights are based on propane and natural gas heating saturations from the 2007 to 2022 surveys conducted by Big Rivers. These variables are defined similarly for all three of Big Rivers' Member-Owners.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-67: ***Refer to the IRP, Appendix A, pages 101-102. Define and explain the October 2019 Forward variable.***

RESPONSE: This is a binary variable intended to capture likely account reclassifications that occur between retail classes on a distribution Member-Owner's system.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-68: ***Refer to the IRP, Appendix A, page 102. Define and explain the C&I Electricity Price. Include in the response whether the variables are defined similarly for all three Distribution Members.***

RESPONSE: The C&I price is the electricity price paid by the commercial retail consumers of the distribution cooperative after adjusting for inflation. This makes the C&I price variable to the "real" retail price. The variable is defined similarly for all three of Big Rivers' Member-Owners.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF:
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

REQUEST NO. 1-69: ***Refer to the IRP, Appendix A, page 106. Define and explain the 2013 Forward and the 2015 Forward variables.***

RESPONSE: These are binary variables intended to capture likely account reclassifications that occur between retail classes on a distribution Member-Owner's system.

Witnesses: Matt Sekeres and Steve Fenrick (Clearspring)

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Talina R. Mathews, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Talina R. Mathews
Chief Financial Officer
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Talina R. Mathews on this the 2nd day of January, 2024.

My commission expires: October 31, 2024

Notary Public

Notary ID: KYNP16841

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Nathanial A. Berry, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Nathanial A Berry

Name Nathanial A. Berry
Title Chief Operating officer
Company Big Rivers Electric

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Nathanial A. Berry on this the 3 day of JANUARY, 2024.

My commission expires: 1-14-2026

Kayl Lynn Jones
Notary Public

Notary ID: KYNP43026

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Terry Wright, Jr. verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Terry Wright Jr

Name: Terry Wright Jr.
Title: VP of Energy Services
Company: Big Rivers Electric Corporation

STATE OF Kentucky)
) ss:
COUNTY OF Daviess)

SUBSCRIBED AND SWORN TO before me by Terry Wright Jr. on this the 3 day of JANUARY, 2023.

My commission expires: 1-14-2026

Notary Public

Notary ID: KYNP43026

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Christopher Bradley, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Name Christopher Bradley
Title Vice President System Operations
Company Big Rivers Electric Corporation

STATE OF Kentucky)
) ss:
COUNTY OF Daviess)

SUBSCRIBED AND SWORN TO before me by Christopher Bradley on this the 3 day of JANUARY, 2023.

My commission expires: 1-14-2026

Notary Public

Notary ID: KYNP43026

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, John Christensen, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

John Christensen
Senior Project Manager
Burns & McDonnell Engineering Co., Inc.

STATE OF Minnesota)
) ss:
COUNTY OF St. Louis)

SUBSCRIBED AND SWORN TO before me by John Christensen on this the 3rd day of January 2024.

My commission expires: January 31st, 2027

ERIN KAYE JOHNSON
Notary Public-Minnesota
My Commission Expires Jan 31, 2027

Erin K. Johnson
Notary Public

Notary ID: 13076791000037

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Erin M. Murphy, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Erin M. Murphy
Vice President, Federal & RTO Reg. Affairs
Big Rivers Electric Corporation

STATE OF Kentucky)
) ss:
COUNTY OF Daviess)

SUBSCRIBED AND SWORN TO before me by Erin M. Murphy on this the 3 day of JANUARY, 2023.

My commission expires: 1-14-2026

Notary Public

Notary ID: KYNP43026

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Russell L. Pogue, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Russell L. Pogue
Manager Power Marketing
And Member Relations
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Russell L. Pogue on this the 3 day of JANUARY, 2024.

My commission expires: 1-14-2026

Notary Public

Notary ID: KYNP43026

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Christopher A. Warren, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Christopher A. Warren
Executive Director of Budgeting, Planning, and Forecasting
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Christopher A. Warren on this the 2nd day of January, 2024.

My commission expires: October 31, 2024

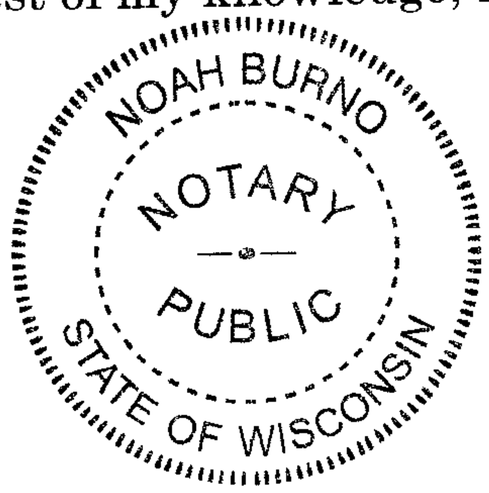
Notary Public

Notary ID: KYNP16841

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Steven A. Fenrick, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.



Steven A. Fenrick
Principal Consultant
Clearspring Energy Advisors, LLC

STATE OF Wisconsin)
) ss:
COUNTY OF Dane)

SUBSCRIBED AND SWORN TO before me by Steven A. Fenrick on this the 5th day of January, 2024.

My commission expires: 2/9/26

Noah Burno
Notary Public

Notary ID:_____

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, Joshua P. Hoyt, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

NOAH BURNO
NOTARY
PUBLIC
STATE OF WISCONSIN

Joshua P. Hoyt
Principal Consultant
Clearspring Energy Advisors, LLC

STATE OF Wisconsin)
) ss:
COUNTY OF Dane)

SUBSCRIBED AND SWORN TO before me by NB Joshua P. Hoyt on this the 5th day of January, 2024.

My commission expires: 2/9/26

Notary Public

Notary ID:_____

IN THE MATTER OF
ELECTRONIC 2023 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2023-00310

BIG RIVERS ELECTRIC CORPORATION'S RESPONSES TO COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION

I, { Matthew Sekeres }, verify, state, and affirm that the information request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Matthew Sekeres

Name Matthew Sekeres
Title Vice President
Company Cleareprings Energy Advisors

STATE OF Wisconsin

COUNTY OF Rock

JULIE T STRUNZ NOTARY PUBLIC STATE OF WISCONSIN

SUBSCRIBED AND SWORN TO before me by Matthew Sekeres on this the 3rd day of January, 2023.

My commission expires: 1/2/27

Julie Strunz

Notary Public

Notary ID:_____