

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
POST-HEARING REQUEST FOR INFORMATION

REQUEST NO. PH-1: *Refer to BREC's response to Joint Intervenors' First*

Request for Information, Item 9, Attachment (RFP Shortlisted Proposal Summary).

- a. Identify what type of thermal resources were bid as included in the RFP Shortlisted Proposal Summary.*
- b. Provide any documents reflecting evaluation of all-source RFP bids prior to passage of the Inflation Reduction Act.*

RESPONSE:

- a. Thermal resource types bid and shortlisted in the RFP included natural gas-fired simple cycle and combined cycle technologies.
- b. Please see the attached CONFIDENTIAL file identifying the shortlisted All-Source RFP bids and reflecting pricing both prior to and following the enactment of the Inflation Reduction Act. The attachment is filed subject to a motion for confidential treatment.

Witness: John Christensen (1898 & Co.)

PSC PH-1 ATTACHMENT

This attachment, in its entirety, has been submitted under seal with an accompanying request for confidential treatment.

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REQUEST NO. PH-2: *Refer to Hearing Testimony (HVT) of Jason Burden, HVT at 11:09:42. Explain what additional maintenance would be needed if the hypothetical Green Station Natural Gas Combined Cycle (NGCC) unit was used consistently for energy generation as opposed to fulfilling MISO capacity obligations for the integrated resource planning period.*

RESPONSE: The projected maintenance included in the IRP modeling for the hypothetical self-build NGCC reflected the unit's consistent use for energy generation throughout the year. Please see the CONFIDENTIAL "BREC IRP Master Assumptions Workbook," previously provided as a confidential attachment to Big Rivers' Response to Kentuckians for the Commonwealth/Kentucky Resources Council Request No. 1-1.

However, the referenced Hearing Testimony of Jason Burden was in response to a line of questions related to Green Station's existing natural gas-fired units. At HVT 11:09:42, Mr. Burden testified that the existing Green Station units would require "a lot different maintenance routines" subsequent to 2029, "if we are going to depend on it like we do Wilson." The IRP modeling assumptions include these additional post-2029 maintenance costs, including turbine and boiler outages expenses, as well as repairs to other major equipment. Please see the CONFIDENTIAL "BREC IRP Master Assumptions Workbook," previously provided as a confidential attachment to Big Rivers' response to Kentuckians for the Commonwealth/Kentucky Resources Council Request No. 1-1. The idea that the existing Green Station units could continue beyond 2029 corresponds

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to Big Rivers' representations in Case No. 2021-00079 that, "[i]f economical, the useful life of the Green units could be extended, likely to 2043."¹

With respect to Green Station maintenance expenses estimated through 2029, the IRP modeling reflects the projected use of the existing Green units as a short-term capacity resource projected to be dispatched less than ten percent of the time.² If the existing Green Station units generate significantly more than projected in the coming years, then the maintenance routine would likewise need to change, conceivably requiring the acceleration of the projected post-2029 maintenance routines described above.

Witness: Jason Burden

¹ *In the Matter of: Electronic Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity Authorizing the Conversion of the Green Station Units to Natural Gas-Fired Units and an Order Approving the Establishment of a Regulatory Asset*, Case No. 2021-00079, Big Rivers' Response to Item No. 7 of the Commission Staff's First Request for Information. *See also id.*, Big Rivers' Response to Item No. 17 of the Commission Staff's First Request for Information ("Assuming the Green converted units operate based upon the hours submitted within the Big Rivers' model, and parts are available for continuous maintenance, its expected lifespan exceeds the full planning period covered by Big Rivers' 2020 IRP.").

² *In the Matter of: Electronic Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity Authorizing the Conversion of the Green Station Units to Natural Gas-Fired Units and an Order Approving the Establishment of a Regulatory Asset*, Case No. 2021-00079, Application at Exhibit A, Direct Testimony of Michael T. Pullen, at page 17, ("Based on the energy market price projections in Big Rivers' 2020 IRP, the conversion of Green Station to natural gas will not substantially increase the number of hours that Green Station runs. The conversion project is needed to satisfy Big Rivers' projected capacity needs, but Big Rivers does not have a projected energy deficit"). *See also id.*, Big Rivers' Response to Attorney General's Request No. 2-2 ("The Green units (NG) will be offered into MISO economic commit. The Green units being dispatched less than ten percent of the time compared to the current thirty percent, would imply that the MISO market is lower than the Green units' dispatch costs and, therefore, making it beneficial for purchase load from MISO.").

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REQUEST NO. PH-3: *Refer to Hearing Testimony of Dr. Talina Matthews, HVT at 12:04:20. Provide a calculation of the estimated cost for carbon capture (\$4 billion) at Wilson Station and provide any documentation generated or relied upon in the calculation or decision-making process that BREC used to decide not to adopt potential carbon capture technology.*

RESPONSE: The projected cost of the project was estimated based on the costs of other known projects pursuing similar technologies. (See IRP § 7.3.2 at p. 145 (“Specific [a]ssumptions for the ACR Portfolio were developed using the latest projections from EIA’s public technology assessment, developed by Sargent & Lundy,¹ along with EPA estimates for carbon capture technologies.²”).) Notably, those other projects are not anticipated to remove the 90% of carbon required by the NewEra program. The inability to purchase a system today to meet the high percentage capture requirements, along with the very tight timeline and the possibility of having to pay back any funding received if NewERA requirements are not met, presented risks too great for a generation & transmission cooperative of Big Rivers’ size. Given this risk to our Member-

¹ See, https://www.eia.gov/analysis/studies/powerplants/capitalcost/pdf/capital_cost_AEO2020.pdf, previously referenced in Big Rivers’ Response to Item No. 42 of the Joint Intervenors’ First Request for Information.

² See, <https://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>, previously referenced in Big Rivers’ Response to Item No. 21 of the Joint Intervenors’ Supplemental Request for Information.

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Owners, the Big Rivers Board of Directors made the determination not to move forward with this funding opportunity.

Witness: Talina R. Mathews

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REQUEST NO. PH-4: *Refer to BREC's response to Commission Staff's First*

Request for Information, Item 9 Table, the IRP, Table 7.1.6(a) page 132 and confidential

Table 7.4.1(a), page 152.

- a. Confirm that the member peak CP used in IRP Table 7.1.6(a) is in part derived by subtracting the BREC CP to MISO CP Coincidence Factor used in the table provided in BREC's response to Staff's First Request, Item 9.*
- b. Explain whether the Base Case Member Peak from 7.1.6(a) in the table is the same peak used when calculating the figures in Table 7.4.1(a). If not, explain what data was used to construct the table. If yes, explain what effect including the BREC CP to MISO CP factor would have on capacity surplus or deficits.*

RESPONSE:

a. Big Rivers' peak coincident to MISO's peak, including transmission losses, is shown in the table provided in Big Rivers' response to PSC Request No. 1-9 as "Base Case Member Peak." Big Rivers' System Coincident Peak with Transmission Losses is shown in that table as "Total Annual Big Rivers CP." To calculate the Base Case Member Peak, which is the value used in IRP Table 7.1.6(a), the Coincident Peak Factor ("BREC CP to MISO CP Factor"), is applied to Big Rivers' System Coincident Peak with Transmission Losses ("Total Annual Big Rivers CP"). To illustrate: In 2024, the Big Rivers' System Coincident Peak with Transmission Losses is 839,930 MWs, and the BREC CP to MISO CP Factor is 94.98%. Consequently, the Base Case Member Peak would be 797,766 MWs (839,930 x .9498).

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b. The values used in IRP Table 7.4.1(a) are the BREC Delivered Peak and the BREC Delivered Peak + Reserve Margin. The BREC Delivered Peak is almost identical (small rounding variances) to the Base Case Member Peak shown in IRP Table 7.1.6(a). The BREC Delivered Peak + Reserve Margin is equivalent to the Base Case Member Peak (BREC's Coincident Peak to MISO, including Transmission Losses) plus Big Rivers' MISO Planning Reserve Margin Requirement. The BREC CP to MISO CP factor reduces Big Rivers' capacity requirement as BREC's peak does not always occur at the same time as the MISO peak.

Witness: Terry Wright Jr.

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REQUEST NO. PH-5: *Refer to Hearing Testimony of John Christensen, HVT at 09:35:27. Provide a calculation demonstrating how BREC set its desired level of capacity compared to reserve margins and provide any documentation generated or relied upon in the calculation or decision-making process that BREC used to set capacity levels.*

RESPONSE: The desired level of capacity reflected in the IRP modeling was Big Rivers' Seasonal Peak plus Seasonal Planning Reserve Margin.

Witness: John Christensen (1898 & Co.)

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REQUEST NO. PH-6: *Refer to Hearing Testimony of John Christensen, HVT at 09:57:45.*

- a. Explain how capital environmental compliance costs were modeled for thermal resources. If there were multiple components to the capital costs, provide a breakdown of the individual components.*
- b. Explain what the model assumes as a proxy or proxies for future environment compliance capital costs. Provide any inputs or data related to these assumptions.*

RESPONSE:

a. Planned capital environmental compliance costs were modeled for Big Rivers' thermal resources. See the CONFIDENTIAL "BREC IRP Master Assumptions Workbook," previously provided as a confidential attachment to Big Rivers' response to Kentuckians for the Commonwealth/Kentucky Resources Council Request No. 1-1. For example, the \$16.6 million of capital costs used to complete the Wilson flue gas desulfurizer ("FGD") was included in the modeling and is reflected in the workbook as an "Environmental Capital Cost." Other planned capital costs related to environmental compliance that are not tracked separately are included in the "Routine Capital Cost" or "Outage Capital Cost" figures.

b. The modeling conducted as part of Big Rivers' IRP included carbon adders in multiple scenarios to serve as a proxy for future costs, including capital environmental compliance costs that are presently unknown in connection with projects not yet identified or planned. The inputs for the carbon adders were previously provided in the CONFIDENTIAL "BREC IRP

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Master Assumptions Workbook," please see Big Rivers' response to Kentuckians for the Commonwealth/Kentucky Resources Council Request No. 1-1.

Witness: Christopher A. Warren

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REQUEST NO. PH-7: *Refer to IRP confidential Table 7.3.2(a) page 146.*

- a. Explain why the capacity penalty for the NGCC is significantly lower than for Wilson Station.*
- b. Explain why the NGCC capital cost is significantly higher than for the Wilson station.*

RESPONSE:

a. The capacity reduction applied to the NGCC was computed based on an AEO technology report for a 1x1 CC 418 MW (net) unit.¹ Post CCS installation, the maximum capacity of the unit was reduced to 377 MW (net). This reduction in capacity, as a percentage, was used to adjust the capacity of the BREC NGCC in the model. The capacity reduction applied to Wilson Station was derived from an EPA study on CCS technology implementation for the facility itself. The input metrics were based on the best available data at the time of filing.

b. As described in subpart a., above, the information provided with respect to each resource is derived from a unique data source. Additionally, costs were estimated on a per kW basis, resulting in different overall capital costs for facilities differing in size. The input metrics were based on the best available data at the time of filing.

¹*Capital Cost and Performance Characteristic Estimates for Utility Scale Electric Power Generating Technologies*, US Energy Information Administration (Feb. 2020),
https://www.eia.gov/analysis/studies/powerplants/capitalcost/pdf/capital_cost_AEO2020.pdf

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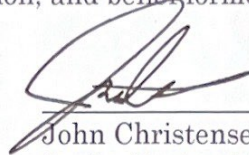
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Witness: John Christensen (1898 & Co.)

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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.

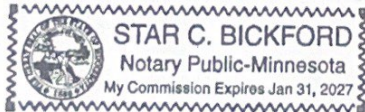


John Christensen
Senior Project Manager
Burns & McDonnell Engineering Co., Inc.

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

10th SUBSCRIBED AND SWORN TO before me by John Christensen on this the day of June, 2024.

My commission expires: 01-31-2027



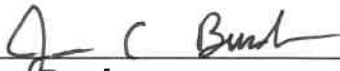
Star C Bickford
Notary Public

Notary ID: 969922300036

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I, Jason Burden, 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.




Jason Burden
Director of Production Services
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

SUBSCRIBED AND SWORN TO before me by Jason Burden on this the 18th
day of June, 2024.

My commission expires: October 31, 2024

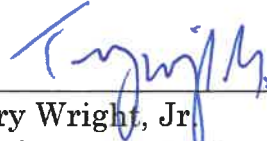


Notary Public
Notary ID: K4NP16841

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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.
VP of Energy Services
Big Rivers Electric Corporation

STATE OF KENTUCKY)
) ss:
COUNTY OF DAVIESS)

18th SUBSCRIBED AND SWORN TO before me by Terry Wright, Jr. on this the
 day of June, 2024.

My commission expires: October 31, 2024



Notary Public

Notary ID: BNP16841

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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.

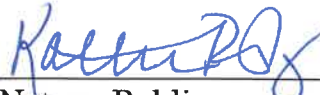


Talina R. Mathews
Chief Financial Officer
Big Rivers Electric Corporation

STATE OF KENTUCKY)
)
) ss:
COUNTY OF DAVIESS)

18th SUBSCRIBED AND SWORN TO before me by Talina R. Mathews on this the
day of June, 2024.

My commission expires: October 31, 2024



Notary Public
Notary ID: KYNP16841

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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 18th day of June, 2024.

My commission expires: October 31, 2024



Notary Public

Notary ID: KYNP16841