

ORIGINAL



COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

| | | |
|---|---|-------------------|
| ELECTRONIC |) | Case No. |
| 2020 INTEGRATED RESOURCE PLAN OF |) | 2020-00299 |
| BIG RIVERS ELECTRIC CORPORATION |) | |

**Responses to Commission Staff's
Second Request for Information
dated
April 16, 2021**

FILED: May 11, 2021

ORIGINAL

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

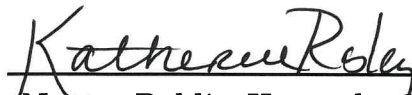
I, Nathaniel A. ("Nathan") Berry, verify, state, and affirm that the data request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.



Nathaniel A. ("Nathan") Berry

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Nathaniel A. ("Nathan") Berry on this the 1st day of May, 2021.



Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP16841

My Commission Expires

October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Christopher S. ("Chris") Bradley, verify, state, and affirm that the data 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 S. ("Chris") Bradley

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Christopher S. ("Chris") Bradley on this the 11th day of May, 2021.



Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP16841

My Commission Expires

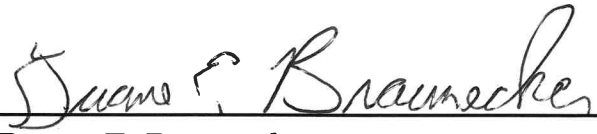
October 31, 2024

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

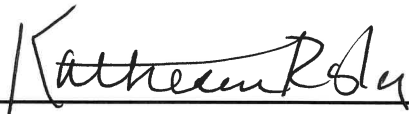
I, Duane E. Braunecker, verify, state, and affirm that the data request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.



Duane E. Braunecker

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Duane E. Braunecker on this
the 17th day of May, 2021.



Notary Public, Kentucky State at Large
Kentucky ID Number KYNP16841
My Commission Expires October 31, 2024

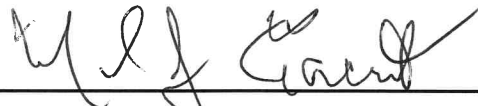


BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Mark J. Eacret, verify, state, and affirm that the data 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.



Mark J. Eacret

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

11th SUBSCRIBED AND SWORN TO before me by Mark J. Eacret on this the
day of May, 2021.



Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP16841

My Commission Expires

October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Steven A. ("Steve") Fenrick, verify, state, and affirm that the data 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. ("Steve") Fenrick

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Steven A. ("Steve") Fenrick
on this the 17th day of May, 2021.



Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP 16841

My Commission Expires

October 31, 2024

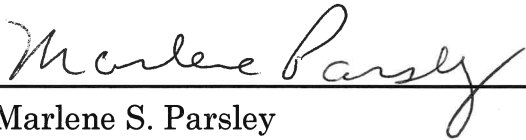


BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

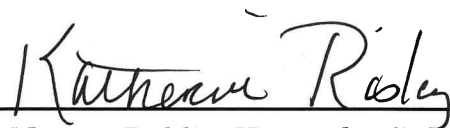
I, Marlene S. Parsley, verify, state, and affirm that the data request responses filed with this verification for which I am listed as a witness are true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.



Marlene S. Parsley

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

11 SUBSCRIBED AND SWORN TO before me by Marlene S. Parsley on this the
11 day of May, 2021.



Notary Public, Kentucky State at Large
Kentucky ID Number KYNP16841
My Commission Expires October 31, 2024




BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION


I, Russell L. ("Russ") Pogue, verify, state, and affirm that the data 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. ("Russ") Pogue

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Russell L. ("Russ") Pogue on this the 17th day of May, 2021.



Notary Public, Kentucky State at Large

Kentucky ID Number KVNP/6841

My Commission Expires October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Michael T. ("Mike") Pullen, verify, state, and affirm that the data 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.

Michael T. Pullen

Michael T. ("Mike") Pullen

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Michael T. ("Mike") Pullen on this the 1st day of May, 2021.

Kathie Boley

Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP16841

My Commission Expires

October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Matthew S. ("Matt") Sekeres, verify, state, and affirm that the data 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

Matthew S. ("Matt") Sekeres

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Matthew S. ("Matt") Sekeres
on this the 17th day of May, 2021.

Katharine Riley

Notary Public, Kentucky State at Large

Kentucky ID Number

KYND16841

My Commission Expires

October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

VERIFICATION

I, Paul G. Smith, verify, state, and affirm that the data 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.

Paul Smith

Paul G. Smith

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

11th SUBSCRIBED AND SWORN TO before me by Paul G. Smith on this the
day of May, 2021.

Kathleen Rigby

Notary Public, Kentucky State at Large

Kentucky ID Number

KYNP16841

My Commission Expires

October 31, 2024



BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 1)** *Refer to BREC's response to Staff's First Request for*
2 *Information (Staff's First Request), Item 4. BREC responds to the condition*
3 *that no additional solar would be added as a supply side option and*
4 *discusses 100 percent solar capacity. Also refer to page 13 of BREC's IRP.*
5 *BREC states that the total capacity available is 1,374 MW, therefore 260 MW*
6 *of solar represents 19 percent of total capacity.*

7 *a. Explain how adding additional supply side needs via solar implies*
8 *100 percent solar capacity.*

9 *b. Explain whether BREC believes solar penetration above 20 percent*
10 *is not advisable.*

11

12 **Response)**

13 a. The reference to a portfolio of 100% solar capacity was part of a
14 hypothetical discussion of the impact of an all intermittent generation
15 supply. Because of solar capacity's low cost, the Big Rivers long-term
16 model would choose nothing but solar unless limited.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 b. As stated in Big Rivers' responses to Item 2 and Item 3 (b) of the Attorney
2 General's Supplemental Data Requests, Big Rivers' response to Item 25
3 of the Attorney General's Initial Data Requests referenced testimony by
4 Mr. John Bear, Chief Executive Officer of the Midcontinent Independent
5 System Operator, Inc. ("MISO"). Mr. Bear described challenges that
6 started at about the 30% level within MISO. Big Rivers has no reason to
7 believe that Mr. Bear's assessment is inaccurate.

8 However, there is always uncertainty around such an
9 assessment. Addressing that uncertainty is one of the benefits of
10 converting Big Rivers' Green Station coal units to natural gas. That
11 conversion project extends the life of two large dispatchable generators by
12 at least seven years, while progress is being made on the resolution of
13 some of the issues around intermittent generation, such as wind and
14 solar.

15 At this time, Big Rivers has no plans to add any additional solar
16 generation to its generation mix.

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2 **Witness)** Mark J. Eacret

3

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 2)** *Refer to BREC's response to Staff's First Request, Item 8. Also*
2 *refer to Tariff Sheet PSC KY No. 27 Original Sheet No. 23.05, DSM-14 Low-*
3 *Income Weatherization Support Program Pilot. The tariff states an eligible*
4 *member can receive up to \$1,500 per project for the cost of completed health*
5 *and safety measures and up to \$1,500 per project for residential HVAC*
6 *improvements.*

7 *a. Explain why BREC spent \$1,702.51 on the Energy Star Ducted Air*
8 *Handler – HVAC.*

9 *b. Explain why BREC listed health and safety measures with the new*
10 *HVAC system listing.*

11

12 **Response)**

13 a. It is common that HVAC systems are replaced or repaired under the
14 umbrella of health and safety. In this case the homeowner was using
15 vent-less propane heaters and electric space heaters. The vent-less
16 heaters produce carbon monoxide and create moisture issues in the living

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 space; these results create safety and health conditions that make the
2 \$1,702.51 expenditure qualify as both HVAC and health and safety.

3 b. See Big Rivers' response to sub-part a.

4

5

6 **Witness)** Russell L. Pogue

7

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 3)** *Refer to BREC's response to Staff's First Request, Item 11.*

2 *a. Provide the forecasted rate of inflation used by BREC.*

3 *b. Explain whether or not BREC continues to support the assumption*
4 *that the forecasted price of electricity will continue to grow at a*
5 *lower rate than the forecasted rate of inflation.*

6

7 **Response)**

8 a. The forecasted rate of inflation used in the Load Forecast is provided in
9 the following table.

10

| Big Rivers Electric Corporation Inflation Rate in 2020 IRP's Load Forecast | | | |
|---|-----------------------|-------------|-----------------------|
| Year | Inflation Rate | Year | Inflation Rate |
| 2020 | 1.9 % | 2030 | 1.9 % |
| 2021 | 2.1 % | 2031 | 1.9 % |
| 2022 | 2.1 % | 2032 | 1.9 % |
| 2023 | 2.0 % | 2033 | 1.9 % |
| 2024 | 1.9 % | 2034 | 1.9 % |
| 2025 | 1.9 % | 2035 | 1.9 % |
| 2026 | 1.9 % | 2036 | 1.9 % |
| 2027 | 1.9 % | 2037 | 1.9 % |
| 2028 | 1.9 % | 2038 | 1.9 % |
| 2029 | 1.9 % | 2039 | 1.9 % |

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 b. Big Rivers continues to support its assumption that the retail electricity
2 rate assumed in its Load Forecast (Appendix A of Big Rivers' 2020
3 Integrated Resource Plan) is projected to grow at a lower rate than
4 forecasted inflation.

5

6

7 **Witnesses)** Matthew S. Sekeres and

8

Steven A. Fenrick

9

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 4)** *Refer to BREC's response to Staff's First Request, Item 13.*
2 *Further explain the financial hedging products, such as future and*
3 *forward contracts, or methods utilized to supply BREC's nonmember*
4 *commitments.*

5

6 **Response)** The energy settlement point for Big Rivers' Nebraska customers is a
7 Locational Marginal Price ("LMP") at the SPP/MISO¹ seam called MISO.NPPD.
8 Big Rivers purchases Financial Transmission Rights ("FTRs") between our
9 generators in western Kentucky and MISO.NPPD to provide some protection
10 against volatility in the basis between the two points. Big Rivers purchases
11 capacity in the Southwest Power Pool for terms of one to five years to avoid year-to
12 -year volatility in the SPP capacity market.

13 The settlement point for the Big Rivers agreement with Owensboro
14 Municipal Utilities ("OMU") is the MISO/KU seam. Big Rivers purchases FTRs
15 between its Wilson Station and the MISO/KU seam to provide some protection
16 against volatility in the basis between the two points. Big Rivers also hedges its

¹ SPP/MISO = Southwest Power Pool / Midcontinent Independent System Operator, Inc.

^BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 OMU energy requirement at IndyHub, which is the most liquid MISO trading hub.
2 Big Rivers put several monthly hedges in place during 2020 and has annual hedges
3 in place for 2021 through 2023.

4 Under the energy hedges, Big Rivers pays the hedge counterparty a fixed
5 price and the counterparty pays Big Rivers the floating hourly price at IndyHub.
6 The floating hourly price received from the counterparty at IndyHub offsets the
7 floating hourly price paid to OMU at the MISO/KU seam as part of the contract
8 settlement. Big Rivers purchases FTRs between IndyHub and the Wilson Station
9 to provide some protection against the volatility in the basis between the two points.

10 Please see Big Rivers' response to Item 5 of the Commission Staff's Second
11 Request for Information for a discussion of hedging and the KYMEA² contract.

12

13

14 **Witness)** Mark J. Eacret

15

² KYMEA = Kentucky Municipal Energy Agency.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 5)** *Refer to BREC's response to Staff's First Request, Item 13, page*
2 *3, lines 1–3. Explain why BREC does not use financial hedging products or*
3 *strategies against the Kentucky Municipal Energy Association (KYMEA)*
4 *contract, despite the consumption being more volatile than Owensboro*
5 *Municipal Utilities (OMU).*

6

7 **Response)** Hedging products protect Big Rivers from price, not volume, risk. The
8 KYMEA contract resembles a call option. It will only be exercised when the
9 KYMEA believes that the Locational Marginal Price ("LMP") at [REDACTED]
10 [REDACTED]. Therefore, hourly volumes will
11 almost always be either [REDACTED] MWs or zero. In the nearly two years that the contract
12 has been in place, the monthly load factor has varied from 4.2% to 75.4%. Our
13 supply obligation to OMU is much more predictable.

14 A price hedge at KYMEA would introduce additional risk during those hours
15 when KYMEA takes zero MWs. Big Rivers would realize the cost or benefit of the
16 hedge settlement without an offsetting hourly transaction under the KYMEA
17 contract.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2

3 **Witness)** Mark J. Eacret

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 6)** *Refer to BREC's response to Staff's First Request for*
2 *Information, Item 19. Explain whether or not BREC would consider other*
3 *budget scenarios for DSM programs.*

4

5 **Response)** Big Rivers will consider additional budget scenarios for future
6 program development with its Member–Owners.¹ Should Big Rivers file an
7 application for proposed programs with the Commission, specific program plans and
8 budgets would be developed for that application.

9

10

11 **Witness)** Russell L. Pogue

12

¹ Big Rivers' Member–Owners are Jackson Purchase Energy Corporation, Kenergy Corp., and Meade County Rural Electric Cooperative Corporation.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 7)** *Refer to BREC's response to Staff's First Request, Item 20, page*
2 *3, lines 1–3, and to the IRP, Chapter 8, Section 8.2.2, page 156. Explain the*
3 *0.5 percent difference in discount rate used for the NPV calculation in the*
4 *TRC Test Ratio (5.0 percent) vs. the discount rate in the NPV evaluation for*
5 *BREC's IRP ST Plan (4.5 percent), and explain how BREC arrived at these*
6 *discount rates.*

7

8 **Response)** For the TRC Test Ratio, the 5% discount rate was calculated from Big
9 Rivers' five-year historical (2015–2019) weighted average interest rate on long–
10 term debt. For the 2020 IRP PLEXOS models, the 4.5% was calculated from Big
11 Rivers' five-year weighted average interest rate for the 2020–2024 time–frame
12 included in the Big Rivers Board–approved long–term forecast (2019–2033 Long–
13 Term Financial Forecast).

14

15

16 **Witness)** Paul G. Smith

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 8)** *Refer to BREC's response to Staff's First Request, Item 21.*

2 *a. Explain which avoided cost components make up the ACES Power*
3 *Marketing forward price curves for both capacity and energy in*
4 *the Midcontinent Independent System Operator (MISO) Zone 6.*

5 *b. Explain whether there are other cost elements that could be*
6 *included through an adjustment to the forward price curves, but*
7 *are not. For example, since the forecasts are made from the*
8 *distribution cooperative level, distribution line losses could be*
9 *included in avoided costs.*

10

11 **Response)**

12 a. The energy curves consist of broker quotes through 2029. From 2030–
13 2032, the prices are modeled by multiplying a fixed heat rate (the
14 observed market heat rate in 2029) by the NYMEX Henry Hub gas price.
15 The ten-year period 2033–2042 is a weighted average of the inflation–
16 escalated, modeled price described in the previous sentence and the IHS
17 Markit North American Power Market Outlook modeled price. From

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 2043–2050 the energy prices are inflation–escalated, IHS Markit–
2 modeled prices. ACES capacity curves consist of market quotes through
3 planning year 2020–2021. From June 2021 to May 2025, the prices are
4 modeled using ACES' Planning Resource Auction forecast. From June
5 2025 to May 2031, the prices are a weighted average of the inflation–
6 escalated, modeled values and the IHS Markit North American Power
7 Market Outlook modeled value. The last year of weighted–average,
8 modeled prices are escalated at inflation through 2050.

9 b. Please see Section 2.5.2 of the Demand–Side Management Potential
10 Study,¹ page 2-9. The 5th bullet states, "Distribution losses of 4.4% and
11 transmission losses of 2.5% were applied to energy and demand as
12 identified in the 2020 Big Rivers load forecast." The energy (kWh) and
13 capacity (kW) savings associated with each measure had distribution and
14 transmission losses added when calculating the avoided energy and
15 demand savings. There was no need to adjust the avoided costs since the

¹ Appendix B of Big Rivers 2020 Integrated Resource Plan.

BIG RIVERS ELECTRIC CORPORATION
ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299

Response to Commission Staff's
Second Request for Information
dated April 16, 2021

May 11, 2021

1 product of the two would equal the loss adjusted total avoided cost for a
2 particular measure.

3

4

5 **Witness)** Russell L. Pogue

6

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 9)** *Refer to BREC's response to Staff's First Request, Item 29a,*
2 *Attachment bullet points, pages 7–8. In an era of widely divergent state*
3 *energy policies, declining reserve margins and the many implications of the*
4 *trends discussed on Mr. Bear's testimony, MISO can no longer be confident*
5 *about a number of things.*

6 *a. It is not clear exactly why the issues enumerated in the bullet*
7 *points create operational issues for MISO. Provide additional*
8 *explanation from an engineering perspective that highlights the*
9 *problems.*

10 *b. Provide additional explanation for each of the bullet points*
11 *including subparts as to whether the issues that MISO can no*
12 *longer be confident in pertains to BREC in any way. If so, provide*
13 *a specific example (operational, financial, or planning) of how*
14 *BREC is affected and, if possible, how BREC will handle the*
15 *problem.*

16

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Response)**

2 a. In his discussion of “Building a 100 Percent Clean Economy: Solutions
3 for the U.S. Power Sector,” Mr. Bear highlighted some key components of
4 the bulk electric system under MISO’s control. From a Resource
5 Adequacy perspective, the traditional form of capacity planning which
6 assumes adequacy by demonstrating the needs for one summer peak hour
7 changes with the emergence of intermittent resources which may not be
8 available at that one summer hour.¹ Other, non–summer hours have
9 increasingly experienced tight conditions, and the current approach to
10 resource accreditation does not adequately reflect operational availability
11 of resources during times of need. Operating the MISO footprint requires
12 MISO to meet NERC² standards for frequency response to maintain
13 Interconnection Frequency within predefined bounds. MISO must specify
14 a system voltage schedule to achieve Voltage control standards and
15 operate within System Operating Limits and Interconnection Reliability

¹ <https://www.misoenergy.org/stakeholder-engagement/issue-tracking/resource-availability-and-need-ran---resource-adequacy-construct/>

² NERC = North American Electric Reliability Corporation.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 Operating Limits. MISO also must have available Black–Start capability
2 to facilitate reliable and complete system restoration following a
3 shutdown of the bulk power Transmission System. MISO must maintain
4 NERC standards and per MISO’s tariff must calculate and communicate
5 price signals to generators every five (5) minutes and generator set points
6 every four (4) seconds. In his testimony, Mr. Bear expressed lack of
7 confidence that without change, current marginal cost pricing will not
8 incentivize the proper mix of resources to be built, available and online.
9 For example, if insufficient generators with the ability to respond to
10 frequency and voltage schedules remain on line, MISO will struggle to
11 maintain reliable service while operating within NERC standards.

12 Mr. Bear also expressed concern that emergence of resources
13 connected to the distribution system may require the transmission system
14 to be used in a way it has not been used in the past. For example,
15 intermittent generation located on the distribution system and operated
16 independently of the MISO market may change the expected load pattern
17 for which the transmission system was designed. See the “MISO Forward

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 2019,”³ “MISO Forward 2020,”⁴ and “MISO Forward 2021”⁵ documents
2 from MISO’s website for more detailed information.

3 b. The issues identified in Mr. Bear’s testimony affect Big Rivers when
4 MISO changes its tariff. MISO’s responsibility is to reliably and
5 efficiently operate the bulk electric system, and Big Rivers is responsible
6 to comply with provisions under the MISO tariff while continuing to bring
7 value to our Member–Owners. For example, Big Rivers participates in
8 the MISO Planning Resource Auction, Day Ahead and Real Time Energy
9 and Ancillary Services Market which involves both purchase and sale of
10 services by MISO. Big Rivers’ Member–Owners are impacted by the
11 prices paid and revenues received from MISO for services, so least–cost
12 resources are planned to meet Big Rivers’ Member–Owners’ needs
13 including market price exposure risk. In addition, Big Rivers’ personnel
14 actively participate in MISO outreach and stakeholder meetings to be

³ <https://cdn.misoenergy.org/MISO%20FORWARD%202019324749.pdf>

⁴ https://cdn.misoenergy.org/MISO%20FORWARD_2020433101.pdf

⁵ <https://cdn.misoenergy.org/MISO%20FORWARD%202021545008.pdf>

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 aware of market changes and provide input to help guide efficient
2 processes. Big Rivers' employees also actively participate in MISO's
3 Transmission Expansion Planning processes, providing input and
4 information to allow efficient and effective transmission planning. When
5 necessary, Big Rivers-specific projects are submitted to the Commission
6 for approval.

7

8

9 **Witness)** Marlene S. Parsley

10

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 10)** *Refer to BREC's response Staff's First Request, Item 30. Explain*
2 *the operational characteristics of the referenced customer's 50 MW of co-*
3 *generation capability and how it affects BREC's operations and its*
4 *interactions with the MISO energy, capacity, ancillary services or other*
5 *markets.*

6

7 **Response)** The above-referenced co-generation capability is identified in United
8 States Energy Information Administration Form EIA -860¹ as Plant Code 55249 -
9 Domtar's Kentucky Mills Wood/Wood Waste Biomass Combined Heat and Power
10 with a nameplate capacity of 88 MWs, summer capacity of 49 MWs and Winter
11 Capacity of 60 MWs. This generator is integral to the Second Amended and
12 Restated Agreement for Retail Electric Service Between Kenergy Corp. and Domtar
13 Paper Company, LLC ("Domtar").² This behind-the-meter co-gen facility supplies
14 all or a portion of Domtar's electric load at Domtar's facilities in Hawesville,
15 Kentucky, and Big Rivers established metering protocols that allow this behind-

¹ <https://www.eia.gov/electricity/data/eia860/>

² <https://psc.ky.gov/Home/Library?type=Tariffs&folder=Electric%5CKenergy%20Corp%5CContracts%5CDomtar%20Paper%20Company>

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 the-meter generator to net against the gross load of the Domtar paper
2 manufacturing facility, and further to allow the Firm Power portion of Domtar load
3 to be included in Big Rivers' net load and Domtar Backup load to be separated from
4 Big Rivers' net load. Please see Big Rivers' response to Item 54 of the Commission
5 Staff's First Request for Information for details on Firm Power.

6 For interactions with MISO markets, Big Rivers (as Market Participant) has
7 defined a Commercial Pricing ("CP") Node in the MISO energy and ancillary
8 services market to represent the net load above Domtar's Firm Power Billing
9 Demand, and has identified a separate Domtar asset owner to represent the billing
10 at this node. Utilizing a separate CP node and asset owner for meter data
11 submission and billing serves to separate MISO energy, ancillary services, and
12 transmission charges for Domtar backup load from MISO charges related to Big
13 Rivers' load which includes Domtar's Firm Power Demand and Energy. The co-
14 gen resource is registered in MISO's Module E Capacity Tracking Tool as a Behind-
15 The-Meter Generator and is used to offset the capacity needs for backup power at
16 the Domtar Load Node.

17

BIG RIVERS ELECTRIC CORPORATION
ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299

Response to Commission Staff's
Second Request for Information
dated April 16, 2021

May 11, 2021

1

2 **Witness)** Mark J. Eacret

3

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 11)** *Refer to BREC's response to Staff's First Request, Item 34,*
2 *confirm that the four-year transmission system construction work plan is*
3 *updated and submitted to MISO annually.*

4

5 **Response)** Big Rivers reviews its four-year transmission system construction
6 work plan annually. It is amended with projects submitted to MISO as appropriate.

7

8

9 **Witness)** Christopher S. Bradley

10

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 12)** *Refer to BREC's response to Staff's First Request, Item 37, page*

2 *1. Provide the current Enterprise Risk Management Policy adopted by*

3 *BREC's Board.*

4

5 **Response)** Please see the attached document.

6

7

8 **Witness)** Mark J. Eacret

9

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

1. Policy Purpose

The purpose of this document is to formalize the policies of Big Rivers Electric Corporation (“Big Rivers”) regarding Enterprise Risk Management (“ERM”). Accordingly, this policy will set forth Big Rivers’:

- risk management objectives,
- risk governance structure and responsibilities, and
- scope of business activities governed by this policy and the list of associated ERM guidelines and policy documents, and supporting risk management policies.

Big Rivers intends that risk management will support the advancement of its strategic business plan, and will properly manage its business and financial risks through:

- prudent oversight,
- adequate mitigation of risks consistent with Big Rivers’ risk tolerance, and
- sufficient internal controls and procedures.

Managing the enterprise-wide risks of Big Rivers’ business entails the coordination of resources and activities among all departments within Big Rivers.

2. Risk Management Objectives

Big Rivers exists primarily to safely deliver competitive and reliable wholesale power, and cost-effective shared services desired by its Member-Owners. Managing Big Rivers’ risk is consistent with that mission, and serves the following objectives:

- to maintain risk within desired tolerances for a defined period in the future,
- to mitigate price volatility to the Member-Owners,
- to maintain a proactive safety, health, and loss prevention program designed to protect life and property, provide a hazard-controlled work environment, and comply with all applicable regulations,
- to meet lender debt covenants,
- to maintain financial liquidity within desired tolerances,
- to maintain an investment grade credit rating,
- to enhance the value of Big Rivers’ assets/resources,
- to ensure that the risks of business challenges, including load changes, are effectively managed,
- to participate in commodity markets and derivative instruments for hedging and not for speculative purposes, and
- to develop an ERM culture throughout the organization and provide for an ongoing strategic planning process.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

3. Risk Governance Structure and Responsibilities

Risk governance will follow a top-down approach whereby the Board of Directors (“Board”) identifies Big Rivers’ risk management objectives and provides risk management oversight. Supporting controls, policies and procedures will be implemented and aligned throughout the risk governance structure, with distinct roles and responsibilities that result in a risk control environment. Governance and controls include the organizational structure, policies, reporting process and procedures that support Big Rivers’ business models, risk tolerances, power supply objectives, financial objectives, safety objectives, and segregate responsibilities appropriately.

a. Board – ERM Duties

- Approves Big Rivers’ ERM objectives, and the president and chief executive officer’s (“CEO”) authority limits to conduct risk management transactions,
- Approves annually Big Rivers’ budget and financial plan. Both shall be consistent with the Board’s desired risk management objectives, time horizons, and risk tolerance for managing enterprise risk,
- Approves, periodically reviews, and makes recommended changes to the ERM Policy that establishes an overall framework for evaluation, management, and control of risk,
- Approves participation in specific commodity markets and derivative instruments,
- Establishes scope and frequency for management reporting to the Board,
- Periodically reviews risk exposures and compliance with policies and procedures,
- Discusses Big Rivers’ major financial risk exposures and the steps management has taken or will take to mitigate, control, and monitor such exposures,
- Reviews and approves any new commodity products, locations, or markets,
- Approves management staff to serve as members of an Internal Risk Management Committee (“IRMC”), and
- Reviews and approves the energy risk identification and exposure management guidelines (Appendix).

b. CEO – Risk Management Responsibilities and Duties

- Recommends staff to serve as members of the IRMC,
- Has authority to transact within the limits set by the Board in the Trading Authority Policy,
- Approves proper organization, separation, or consolidation of functional activities,
- Assures prudent administrative procedures are established for execution of commodity and derivative transactions, contract controls, credit controls, trading controls, enterprise-wide risk monitoring and measurement, settlement controls, and other risk management activities,
- Ensures that the identification and quantification of risks and related risk mitigation strategies are integrated into the strategic planning process,
- Establishes and maintains an effective working relationship with ACES, and
- Reviews the energy risk identification and exposure management guideline (Appendix).

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

c. IRMC – Responsibilities and Duties

Membership shall be comprised of ten executive voting committee members:

1. CEO
2. Chief Operating Officer
3. CFO
4. VP Human Resources
5. VP System Operations
6. VP Energy Services
7. VP Environmental Compliance
8. Director Communications and Community Relations
9. Director Legislative Affairs and Governmental Relations
10. Executive Assistant

The Director Strategic Planning and Risk Management shall participate as a non-voting member of the committee and serve as the IRMC chairperson. The chairperson shall be responsible for keeping, or causing to be kept, a true and complete record of the proceedings. Other non-voting participants shall participate in the meetings as determined by the executive voting committee members.

The IRMC establishes a forum for discussion of Big Rivers’ significant risks and must develop guidelines required to implement an appropriate risk management control infrastructure, which includes implementation and monitoring of compliance with Big Rivers’ ERM-related policies. The IRMC executes its risk management responsibilities through direct oversight and prudent delegation of its responsibilities to the risk management function, as well as to other Big Rivers’ personnel.

Responsibilities include:

- Reviews and recommends the ERM-related policies and oversees enforcement by the risk management function,
- Ensures that risk management objectives, risk tolerance, and authority limits are employed throughout Big Rivers,
- Requires and reviews reports by the risk management function concerning Big Rivers’ compliance with its risk policies, controls, and procedures, in accordance with established policies, controls, and procedures,
- Recommends to the CEO the proper organizational structure, separation or consolidation of functional risk management activities,
- Reviews and approves proposed risk management strategies for strategic fit, risk exposure consistent with risk tolerance, and reporting and control requirements,
- Ensures approved strategies are consistent with Big Rivers’ strategic plan, risk management objectives, approved risk tolerance, and compliance with risk policies,
- Periodically reviews Big Rivers’ risk management program in light of recent changes in business practices, improved procedures, Big Rivers’ philosophy and strategy, or market changes; and ensures continued compliance with its established guidelines,
- Formulates risk management strategy, policy or procedures necessary for new product or market implementation,

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

- Periodically engages an independent audit (internal and/or external) of risk control policies and procedures,
- Holds formal IRMC meetings at least quarterly, covering applicable risk topics
- Performs a periodic review of transaction compliance with policies and procedures for market transactions executed within Big Rivers,
- Reviews the infrastructure supporting risk management and ensures that it meets the requirements for risk oversight and compliance,
- Reviews compensation policies to ensure they are structured to avoid incentives for excessive risk taking, and
- Implements the Board adopted strategic plan.

d. Risk Management Function – Responsibilities and Duties

This function shall be the responsibility of the Director Strategic Planning and Risk Management. Various departments will be required to provide this function with reports or information required for risk assessment and analysis on a regular or periodic basis. Responsibilities include:

- Performs responsibilities delegated by the IRMC,
- Organizes and chairs the IRMC meetings,
- Engages the IRMC in discussions regarding events or developments that could expose Big Rivers to potential losses,
- Develops, recommends, and administers risk management processes and procedures; provides input to tools to assist in risk management,
- Provides risk management education/training to Board, staff and management,
- Reviews risk management activities, risk controls, and recommends modifications of controls to meet changing business needs,
- Reviews adequacy and accuracy of reports, and reports any deficiencies to the IRMC,
- Assesses risks to Big Rivers in aggregate, by department, and by material business activity,
- Oversees periodic audits of risk control policies and procedures to ensure that Big Rivers complies with its risk policies,
- Reports any violation of Big Rivers’ risk policies,
- Reviews and approves changes to the risk management policies and procedures, as appropriate,
- Reports regularly to the IRMC covering applicable risk topics such as:
 - Portfolio model risk measures (1-48 months),
 - Financial forecasting model risk measures (1 month–15 years),
 - Resource planning model risk measures (2-15 years),
 - Power cost projections,
 - Financial projections,
 - Production output,
 - Credit and contract risk exposures,
 - Policy and procedural violations,
- Reports to the IRMC and Board on Big Rivers’ compliance with its risk policies and risk management in accordance with the policies, and

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

- Reviews and evaluates Risk Management Transactions to ensure compliance with risk management policies.

e. ACES – Roles and Responsibilities

Big Rivers is a member of ACES and uses this alliance to obtain selected energy risk management and transaction execution services. In accordance with the agreements between Big Rivers and ACES, ACES is authorized to and shall:

- Periodically provide Big Rivers with a controls audit report from an independent auditor,
- Execute transactions on behalf of Big Rivers in accordance with established delegations of authority and compliance requirements set forth by the CEO,
- Administer counterparty contracts and manage credit in compliance with the Credit Policy according to the types of agreements the Big Rivers’ CEO or the CFO, as delegated by the CEO, authorizes ACES to administer,
- Provide Big Rivers with reports on individual transaction details, commodity positions, and counterparty credit positions for transactions executed by ACES each business day,
- Provide Big Rivers with periodic risk profile reports addressing its energy risk and recommend hedging strategies within the time horizon specified by Big Rivers for assessment, but typically within the 1-60 month horizon,
- Capture Big Rivers’ power transactions in ACES’s risk management systems,
- Monitor compliance of power and natural gas transactions with Big Rivers’ Energy Related Transaction Authority Policy (Board Policy 105),
- Confirm and settle transactions with Big Rivers’ counterparties for natural gas and power transactions authorized by the CEO or the VP Energy Services, as delegated by the CEO, for ACES to administer, and
- Mark-to-market forward energy supply transactions for credit exposure purposes.

4. Scope of Business Activities Governed by this Policy

The scope of this policy is designed to address the management of the enterprise-wide risk associated with Big Rivers including, but not limited to:

- Commodity price risk,
- Volumetric risk,
- Power and fuel delivery risk,
- Operational risk,
- Financial risk,
- Environmental and regulatory risk,
- Counterparty contract and credit risk,
- Organizational risk,
- Board and officer risk, and
- Safety risk.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

The ERM and strategic planning functions of Big Rivers will facilitate the development and monitor the implementation of a strategic plan that will incorporate enterprise risks that require additional strategic focus. The plan will be consistent with the risk management policies and objectives of Big Rivers.

5. Associated ERM Guidelines and Policies

Supporting guidelines and policies are required as outlined below. Responsibility for their approval, modification, oversight, and compliance shall be consistent with the governance section of this policy and unless otherwise stated does not require the approval of the Board.

- Energy Related Transaction Authority Policy (Board Policy 105)
- Economic Development Policy (Board Policy 112)
- Risk Management Sanctions Policy (Board Policy 110)
- Safety Policy (Board Policy 124)
- Hedge Policy (Board Policy 111)
- Energy Related Transaction Credit Policy (Board Policy 122)
- Financial Policy (Board Policy 118)
- Appendix Energy Risk Identification and Exposure Management Guidelines

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

Appendix

1. Identification of Enterprise-Wide Risks

The enterprise-wide energy portfolio of Big Rivers is naturally exposed to the following primary risks:

- Commercial operational risk
 - Inadequate controls and procedures
 - Errors and fraud
- Commodity market price risk
 - Power
 - Fuels
 - Emission allowances
 - Bulk materials
- Concentration risk (or lack of diversity)
 - Suppliers
 - Coal
 - Steam coal generation unit technology
- Contract risk (counterparty performance)
 - Large industrial contract default
 - Replacement load
- Credit risk
 - Bad debts expense
 - Supplier bankruptcy (mark-to-market risk)
 - Large industrial bankruptcy
- Delivery risk
 - Transmission risk (aka congestion)
 - Fuel delivery risk
- Financial risk
 - Financial liquidity (cash flow, meeting debt covenants)
 - Interest rates
- Operations risk
 - Generation unit outages
 - Transmission outages
- Organizational risk
 - Retention of current workforce
 - Development of employees
 - Recruitment of replacements for retirements
- Regulatory and environmental risk
 - Federal and state regulatory changes
 - Environmental regulations

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

- Safety and hazard control risk
 - Loss of life
 - Injuries/illness
 - Equipment damage
 - Loss of employee productivity
 - Federal, state and local regulations
- Volumetric risk
 - Load forecast/weather variability risk
 - Forced outage/derate risk
 - Loss of load

Section 2 of this document defines these primary risks and other relevant definitions.

Section 3 identifies the tools and provides guidelines as to how risks shall be managed under most conditions.

Section 4 provides a description of Big Rivers' power supply risk profile and why it differs from others engaged in the energy markets.

2. Definition of Risks

Commercial operational risk is the risk of loss from inadequate or failed internal processes, people, and systems.

Commodity market price risk is the risk of loss due to potential fluctuations in the prices of an underlying energy commodity. In the wholesale power market, Big Rivers has risk that commodity prices rise, spike or are generally high when it is short of meeting its firm supply obligations. Big Rivers has risk that prices fall or are generally low when it has excess capacity or electric energy compared to its firm supply obligations.

Commodity market price risk occurs across all tenors, from the hourly market to the long-term forward market (5 years +). Big Rivers is exposed to commodity price risk for power, coal, natural gas, emission allowance (e.g. SO₂, NO_x, etc.), fuel oil and various bulk materials (e.g. ammonia, limestone, etc.) that exhibit price volatility.

Contract risk or counterparty performance risk is the risk of a potential adverse occurrence of a counterparty's ability to operationally perform on an agreement or due to contractual provisions that leave Big Rivers with no recourse under an event of default.

Concentration risk is the risk of having large exposures to significant power supply components. Concentration risk can be found with suppliers (contract and credit risk), generation units (outage risk), unit technology (environmental), and native load customers.

Credit risk is the risk of a potential adverse occurrence of a counterparty's ability to pay its obligations (debts) to Big Rivers or that a supplier declares bankruptcy and abrogates a supply contract that must be replaced during a time of higher commodity market prices.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

Delivery risk is the risk that Big Rivers cannot meet a firm supply obligation due to a transmission constraint. Delivery risk is natural to Big Rivers in meeting its firm supply obligations and reliability of service. Big Rivers can also be exposed to delivery risk in the transportation of its fuel supply.

Financial risk is the risk that a company's scarce resources are not best employed, resulting in adverse financial consequences. Quantification of risks in terms of their impact on financial measures including Member-Owners' rates, costs per MWh, margins, cash flow, credit, derivatives, TIER and DSC will be considered in risk analysis and mitigation. Risk quantification and mitigation pursuant to appropriate risk tolerance shall have significant focus.

Cash margin risk is the risk associated with inadequate cash flow resulting from margin requirements of a contractual agreement. For example, the EEI Master Agreement provides that counterparties may margin each other when they are overexposed above credit thresholds that were negotiated between the parties when the agreement was executed. Credit exposures include replacement cost exposure on a mark-to-market basis when a counterparty's position is out-of-the-money.

Operations risk is the risk associated with physical assets. This would include failures or outages associated with generation units, fuel delivery systems (weather or mechanical), generation step-up transformers, the transmission system, control systems, or other critical components associated with the production or delivery of electricity.

Organizational risk is the risk of being able to keep our current workforce in place and providing them with the necessary technical and leadership training opportunities to ensure we have the talent to run our business today and provide talent for the future. It also involves the ability to recruit the necessary people to replace our aging workforce as they retire.

Regulatory and environmental risk is the risk associated with additional environmental regulations that could impact the viability of existing generation assets or impose additional operating costs affecting Big Rivers' net margins. It also includes risk from non-compliance with existing environmental regulations.

Safety and hazard control risk is the risk of loss from an accident or incident that results in bodily injury or property damage disrupting or impairing operations, and exposing the company to liability, repair, and other costs in the process of mitigating the loss.

Volumetric risk is the risk that energy commodity volumes will vary from expected and result in a potential loss due to changing commodity market prices. The primary volumetric risks that Big Rivers is exposed to are load forecast/weather variability risk, forced outage/de-rate risk, load uncertainty, transmission delivery risk, and transmission congestion risk.

Load forecast/weather variability risk is the risk that actual loads differ from forecasted loads due to the error in weather forecasts and load forecasts. This risk is natural to Big Rivers' portfolio since it serves load serving entities. Since this risk will result in Big Rivers being unintentionally long or short in the spot market, it naturally results in hourly market price risk.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

Forced outage and derate risk is the risk that a generating unit does not perform when it is expected to be available, or when it performs below expected capability. This risk is natural to Big Rivers’ portfolio since it owns and operates generation units to meet its load requirements. Since this risk will result in Big Rivers being unintentionally short in the market, it also naturally results in market price risk.

Loss of load risk is the risk that Big Rivers loses a significant portion of one of its Member-Owners’ load and that the market price for electricity coincidentally falls below the sales price of the lost load and thereby creates a financial strain on the company. However, if market prices for electricity remain above the sales price of a potential lost load it would create a financial benefit to the company.

Congestion risk is the risk of negative price differentials between the location of power supplies and the demand location. If Big Rivers needs to buy electricity and the transmission system is congested, it would pay a premium to secure the needed electricity, if it is available at all. If Big Rivers has excess electricity to sell and the transmission system is congested, then it may not be able to sell the excess or may have to sell at a discounted price to a non-congested area. Congestion risk typically manifests itself in power commodity market price risk.

3. Guidelines and Tools to Manage Risk

ERM Framework Assessment and Risk Dictionary

These tools are used to identify and prioritize risks and the gaps at Big Rivers for effectively managing enterprise-wide risk. The ERM function of the company will assess the ERM framework including gaps in: data, tools, processes, and education/skills gaps necessary for effectively managing risk. Additionally, the ERM function will identify and prioritize all of the enterprise risks of the organization and assure that each risk is being effectively managed within the policies and risk tolerance of the organization. Outcomes of these tools will be a key input to the strategic planning function of Big Rivers.

Strategic Planning Process

Big Rivers periodically deploys a strategic planning process that identifies and addresses strategic issues, high priority risks, and gaps in the ERM framework. Several sources will have input into the strategic plan including employees, the Board, CEO, Member-Owners, ERM function, senior staff, and departmental functions. The objective of the process will be to identify and anticipate strategic issues and risks, understand the assumptions, quantify these risks, and enable Big Rivers to move swiftly to develop and implement effective strategies to address them.

Short/Intermediate-Term Planning - Portfolio Model

Market price risks and volumetric risks will be managed in the near term planning cycle (1-60 months forward) utilizing a portfolio model. The portfolio model is a risk assessment of Big Rivers’ energy portfolio based on Monte-Carlo simulation that provides a cumulative probability curve of Big Rivers’ variable costs in forward months, rolled up to years.

Long-Term Planning – Integrated Resource Planning Model

Market risks and volumetric risks will also be managed by long-term resource planning for a period of 2-15 years. Big Rivers’ Energy Services Department will forecast its long-term firm supply obligations based on its expectations for load growth. This tool, along with the short/ intermediate-term portfolio model and the financial forecasting modeling tool, will assist Big Rivers in making appropriate capital

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

investments to meet the needs of its Member-Owners. Big Rivers will seek to meet a planning capacity reserve margin in accordance with applicable reliability region standards. The actual targeted reserve margin will be documented and managed through long-term generation additions and intermediate term purchased power contracts based upon the cost and risk tradeoffs of the company as identified in the Hedge Policy (Board Policy 111).

Financial Forecasting Model

Big Rivers will manage its financial risks and capital planning and budgeting process through the use of a financial forecast modeling tool. The financial forecast modeling tool will include aspects of other short, intermediate, and long-term planning tools to enable Big Rivers to assess cost and risk tradeoffs and impacts on key financial metrics (e.g., targets for TIER, rates, DSC, cash flow, margins) of risk mitigation strategies. The financial forecast will generally be on a monthly basis for approximately 24 months and annually for calendar years beyond that period. The financial forecasting function of the company will work closely with departments that manage key risks and the ERM function.

Delivery Risk

Delivery risks for electricity and fuels will be managed by thoroughly evaluating the risk and procuring firm transmission and transportation in a proactive manner. Delivery procurement strategies will be developed in the Energy Services and Production departments in coordination with electricity and fuel procurement activities. In the event that adequate firm transportation or transmission is not available to adequately mitigate risk, the IRMC will be formally notified as to recommended methods by which it will be managed.

Energy Related Transaction Credit Policy

Credit risk and counterparty performance risk will be managed according to the credit controls, per the Energy Related Transaction Credit Policy (Board Policy 122).

Contract Controls

Counterparty performance risks will be managed according to the Energy Related Transaction Authority Policy (Board Policy 105) and supporting ACES trading control procedures as requested by Big Rivers.

Diversity Management

Big Rivers will manage its concentration risks on a rolling 12-month basis by diversifying its capacity, fuel, and purchased power requirements as defined in the Hedge Policy (Board Policy 111).

Commercial Controls

Big Rivers will manage its commercial operational risks according to trading authority limits to conduct market transactions. The trading authority limits to conduct commodity market transactions are approved by Big Rivers' Board, and are included in the Energy Related Transaction Authority Policy (Board Policy 105). Big Rivers will also manage its commercial operational risks to new products, instruments, or locations according to a control process for such as found in the Energy Related Transaction Authority Policy (Board Policy 105). Numerous other internal controls and procedures shall be in place at Big Rivers to manage other purchasing activities and vendor relationships.

Financial Policy - Liquidity Management

Financial risks will be managed according to the Financial Policy (Board Policy 118) and supporting internal control procedures.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

Hedge Policy

Commodity price risk and volumetric risk will be managed according to the Hedge Policy (Board Policy 111) and supporting internal execution strategies and control procedures.

Risk Management Transactions

Numerous transactions may be entered into to mitigate risk consistent with the Board-approved power supply cost goal and risk tolerance. Several hedging instruments and commodities are used to manage Big Rivers' enterprise risks, which include purchases or sales of physical commodities, financial instruments, fuel transportation, power transmission, power generation capacity, and fuel storage. The following hedging instruments and commodities are permitted to be transacted when used consistent with this policy and its supporting controls, policies and procedures:

- Physical Transactions
 - Forward power, natural gas, solid fuel, fuel oil, and reagents
 - Options on power, natural gas, solid fuel and reagents
 - Spot market power, natural gas, solid fuel, fuel oil, and reagents
 - Power transmission and ancillary services
 - Solid fuel, fuel oil, reagent, and natural gas transportation and ancillary services
- Financial Transactions
 - Futures contracts for power, natural gas, and coal
 - Swap contracts for power, natural gas, coal, and interest rates
 - Options on power, natural gas, and coal
 - Weather protection transactions
 - Unit outage protection transactions

Safety Policy

Safety and hazard control risk will be managed according to the Safety Policy (Board Policy 124), along with supporting internal safety and training policies and procedures.

4. Big Rivers' Energy Supply Risk Profile

Big Rivers operates its power supply function under a different business model than merchant energy companies, and, therefore, has a different risk profile, requiring a different approach to risk management.

- Big Rivers' mission is to safely deliver competitive and reliable wholesale power and cost-effective shared services desired by its Member-Owners,
- Big Rivers is not in the energy business to trade speculatively (buy low – sell high), or to initiate energy risk positions,
- Big Rivers is not in the energy business to take at-risk positions in merchant generation,
- Big Rivers by nature has significant volumetric risk that results from: 1) long-term load serving obligations, 2) the supply hedges used to meet those obligations (generation, forwards, options, demand side management, etc.), and 3) the volumetric differences that occur between numbers 1 and 2 ('unmatched positions'),

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

- Big Rivers participates in the forward term electric market to hedge the market associated risk of its forward positions based on monthly or seasonal forecasted peak loads, plus a capacity planning reserve,
- Big Rivers participates in the weekly/daily/hourly electric market to balance its unmatched positions at the market price in real time, and in the near term timeframe of predictable weather trends,
- Big Rivers also participates in both the short-term and long-term energy markets to hedge its anticipated fuel consumption, financially or physically, and to supply fuel to its generation units,
- Big Rivers is not in the practice of mark-to-market revenue recognition.¹ Revenues from rates to its Member-Owners' systems are cost-based, without variability for mark-to-market fluctuations,
- Unlike managing a portfolio of only standard traded electric products (e.g., 5X16 Firm LD at a pricing hub) that protect the parties financially from volumetric risk, Big Rivers' energy portfolio typically has significant volumetric risk, because:
 - Its load obligations are obviously not flat in volume, they fluctuate hour-by-hour, minute-by-minute,
 - Its loads can be difficult to predict (weather forecasts, weather correlation),
 - It owns generation, which is subject to forced outages and derates,
 - Some of its' supply resources are not financially firm (hydro allocations, unit contingent purchases, non-firm purchases, etc.),
 - It has physical transmission delivery risks,
- Typical derivative risk metrics, such as Value at Risk (VaR), do not factor in volumetric risk, and are, therefore, inadequate to reflect the full risk that is inherent to Big Rivers' business,
- Native load does not behave according to any derivative that can be loaded into a risk system,
- The proper risk measurement and decision support tool for most of Big Rivers' risks are a risk model that incorporates both market price risk and volumetric risk together, and provides for a correlation of native load demand to market prices.

¹Under the GAAP principle of matching revenues and expenses, even the required Accounting Standards Codification section 815 (ASC 815) marks on options are usually deferred from affecting Big Rivers' statement of revenue and expense since the revenue recovery for option premiums will occur in the period(s) that the option can deliver energy.

| Enterprise Risk Management Policy | | | | |
|--|-------------------|--------------------|-------------------|-----------------------------|
| Original Effective Date | 07/16/2009 | Date Last Reviewed | 11/20/2020 | Approved by BOARD |
| Original Approval Date | 06/15/2007 | Date Last Revised | 1/15/2021 | |

| Number | Date | Notes | Approved by |
|-----------------|-------------|--|--------------------|
| Original | 06/15/2007 | Approved to be effective when management deems appropriate | Board |
| Rev 1 | 01/20/2012 | Add Robeson to IRMC, change verbiage relating to Independent Risk Management Function definition | Board |
| Rev 2 | 02/21/2012 | Made revisions to account for retirement of Senior VP Energy Services | Board |
| Rev 3 | 02/20/2015 | General clean up | Board |
| Rev 4 | 11/18/2016 | Added CEO duty, updated IRMC members, clarified language and wording changes to be consistent with other policies. | Board |
| Rev 5 | 11/16/2018 | Updated VP Human Resources title and general clean up | Board |
| Rev 6 | 11/20/2020 | Updated Executive VP Operations title and added VP Environmental Compliance and Executive Assistant as IRMC executive voting members | Board |
| Rev 7 | 01/15/2021 | Changed Executive VP Operations to Chief Operating Officer per Board resolution | Board |

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 13)** *Refer to BREC's response to Staff's First Request, Item 39.*

2 *a. Explain the rationale for setting the LT Plan hourly blocks at six*
3 *hours rather than at four hours to match the Southeastern Power*
4 *Administration (SEPA) dispatch minimum.*

5 *b. Explain what ST Plan options (including specific modeling*
6 *assumptions) and the various option results BREC evaluated that*
7 *led to the determination that the SEPA contract should be*
8 *included in the optimal solution.*

9 *c. Explain whether once BREC determined that the SEPA contract*
10 *should be part of the LT Plan optimal solution, if the LT Plan was*
11 *run again with the SEPA contract as a required component and*
12 *the program left to determine all other components. If not, explain*
13 *how the LT Plan arrived at the optimal solution that included the*
14 *SEPA contract.*

15
16

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Response)**

- 2 a. The six-hour block was chosen to be used in the LT Plan modeling after
3 a discussion with another PLEXOS user before Big Rivers' 2017
4 Integrated Resource Plan ("2017 IRP") models. This PLEXOS user
5 advised Big Rivers that they had found the six-hour block duration
6 provides accurate results when compared to ST Plan model results
7 without causing too long of LT Plan model run times. As explained in
8 Section 8.2.2 Base Case Results, pages 155, of Big Rivers' 2020 Integrated
9 Resource Plan ("2020 IRP"), "Big Rivers utilized the Preliminary LT Plan
10 results to develop seven portfolio options using the ST Plan model." Since
11 Big Rivers used the ST Plan models for developing Big Rivers' optimal
12 plan, the six-hour block duration in the LT Plan models is not being used
13 in determining Big Rivers' optimal plan.
- 14 b. As stated in Big Rivers' response to Item 39 of Commission Staff's First
15 Request for Information, the ST Plan does not solve or provide capacity
16 resources additions or subtractions, but the ST Plan model's capacity
17 resources changes are provided as inputs. Big Rivers evaluated multiple

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 portfolio options (capacity resource changes) in individual ST Plan models
2 as discussed in Section 8.2.2 Base Case Results, pages 155–156, of the
3 2020 IRP. As shown in Table 8.8, page 157, SEPA was included as a
4 capacity resource in the least-cost or optimal plan.

5 c. Section 8.2.2 Base Case Results on pages 155–156 of Big Rivers' 2020 IRP
6 explain how the optimal plan was derived. The LT Plan was not rerun
7 with SEPA as a required resource. The Big Rivers 2020 IRP optimal
8 solution was derived utilizing the portfolio options in the ST Plan models
9 and as explained on page 156, "achieves objectives that Big Rivers is
10 aggressively pursuing by right sizing its generation to Member–Owners'
11 load, diversifying its generation portfolio, and moving toward carbon–free
12 resources when economically feasible."

13

14

15 **Witness)** Duane E. Braunecker

16

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 Item 14) *Refer to BREC's response Staff's First Request, Items 40d, 41e,*
2 *and 41f, and also refer to Case No. 2021-00079 Application, paragraph 17,*
3 *page 6 of 15. Item 40d states that the natural gas combined cycle (NGCC)*
4 *unit needs to be at least 600 MW capacity to achieve a cost effective heat*
5 *rate. The Application in Case 2021-0079 at paragraph 17 states that the*
6 *total capacity of the two Green units post conversion will be reduced from*
7 *the current 454 MW to 414 MW.*

8 a. *With the conversion of the two Green units to NGCC, explain*
9 *whether that obviates the need per the LT Plan for 90 MW of a new*
10 *592 MW NGCC unit.*

11 b. *If not already addressed, explain how the two Green unit*
12 *conversions to NGCC affects the ST Plan and the LT Plan.*

13 c. *Explain whether the Green units as NGCC will be able to provide*
14 *any ancillary services within the MISO markets.*

15 d. *Explain whether the Green units as NGCC will have black start*
16 *capability.*

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Response)** To clarify, in Case No 2021-00079¹ Big Rivers is proposing to convert
2 the Green units to natural gas-fired units (“Green NG”) and not NGCC units.

3 a. No changes are required in the 20-year (2024–2043) IRP models as the
4 90 MW stake in a 592 NGCC unit would be included in the optimal plan.

5 b. Please see Big Rivers’ response to sub-part a.

6 c. The Green NG units will be able to provide ancillary services to MISO
7 similar to the Green units as coal-fired units.

8 d. The Green NG units will not have black start capability.

9

10

11 **Witness)** Duane E. Braunecker

12

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 15)** *Refer to BREC's response to Staff's First Request, Item 41b.*
2 *BREC states that it would exit the SEPA contract if it were beneficial to its*
3 *Member-Owners. Also refer to BREC's response to Staff's First Request, Item*
4 *39. BREC states that the LT Plan's least-cost solution included exiting the*
5 *SEPA contract. Reconcile these two statements.*

6

7 **Response)** Big Rivers would exit the SEPA contract if it were beneficial to its
8 Member-Owners. Big Rivers response to Item 39 of the Commission Staff's First
9 Request for Information, lines 7-10, states, "The Preliminary LT Plan had the
10 least-cost solution including exiting the SEPA contract and adding more Natural
11 Gas Combined Cycle ("NGCC") capacity. Big Rivers evaluated multiple portfolio
12 options in the ST Plan and determined retaining the SEPA contract provided the
13 optimal solution."

14

15

16 **Witness)** Duane E. Braunecker

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 16)** *Refer to BREC's response to Staff's First Request, Item 41h.*
2 *Since BREC has committed to converting the two Green units to NGCC,*
3 *explain whether natural gas will be procured on a firm or spot basis and*
4 *whether pipeline transportation will be on a firm or spot basis.*

5

6 **Response)** In Case No. 2021-00079.¹ Big Rivers has asked the Commission to
7 approve converting its Green units to natural gas-fired units ("Green NG") and not
8 NGCC units. The natural gas to fire the Green NG units in Case No. 2021-00079
9 will be purchased on a spot basis with delivery charges being added when natural
10 gas is consumed.

11

12

13 **Witness)** Nathaniel A. Berry

14

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 17)** *Refer to BREC's response to Staff's First Request, Item 41k.*
2 *Explain whether wind resources are not economically feasible due to the*
3 *BREC board's preference for resources to be owned by BREC, or insufficient*
4 *wind potential in BREC's service territory, or wheeling costs from a remote*
5 *location, or some other reason.*

6

7 **Response)** The market is saying that there are currently better choices than wind
8 in western Kentucky. Refer to the "MISO Generator Interconnection Queue –
9 Active Projects Map" at:

10 <https://giqueue.misoenergy.org/PublicGiQueueMap/index.html> and select "Wind".

11 There is only one wind project south of Indianapolis in Zone 6 in the MISO
12 interconnection queue. The nearest developments are in a band that runs
13 southwest from Northern Indiana to Northern Missouri. Big Rivers would prefer
14 to avoid the price basis issues that would come with generator locations so far from
15 Big Rivers' load.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 Even if the proximity of generator locations were not an issue, Big Rivers
2 would still prefer more experience with intermittent generation on its system before
3 expanding beyond the 260 MWs of solar.

4

5

6 **Witness)** Mark J. Eacret

7

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 18)** *Refer to BREC's response to Staff's First Request, Item 42.*
2 *Compare and contrast how BREC anticipates running the Green units as*
3 *NGCC units as opposed to how the Green units as coal fired units actually*
4 *ran over the last three years.*

5

6 **Response)** First, to clarify, Big Rivers believes the Commission Staff is asking to
7 compare how the Green units, as natural gas-fired (not the NGCC unit), anticipates
8 running as opposed to how the Green units, as coal-fired units, actually ran for the
9 last three years.

10 The Green units as natural gas-fired units will be offered into MISO in the
11 same manner as the Green units as coal-fired units, only with the updated cost and
12 performance parameters for the natural gas-fired units. Please see the tables on
13 the following page. The first shows the Green units as coal-fired units for 2018–
14 2020 and *projected* for 2021. The second displays the *projected* annual generation

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 and net capacity factors for the Green units as natural gas-fired units in the Case
2 No. 2021-00079.¹

3

| Big Rivers Electric Corporation Green Station – Coal-Fired Units Generation and Net Capacity Factor (NCF) | | | | | |
|--|-------------------|-------------|-------------|-------------|-------------|
| | | 2018 | 2019 | 2020 | 2021 |
| Green 1 | Generation (MWHs) | 1,475,832 | 1,256,005 | 731,254 | |
| Green 2 | Generation (MWHs) | 1,583,267 | 1,085,146 | 393,856 | |
| Green 1 | NCF (%) | 72.9% | 62.1% | 36.0% | |
| Green 2 | NCF (%) | 81.0% | 55.5% | 20.1% | |

4

| Big Rivers Electric Corporation Green Station – Natural Gas-Fired Units Generation and Net Capacity Factor (NCF) | | | | | | | | |
|---|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Green 1 | Generation (MWHs) | | | | | | | |
| Green 2 | Generation (MWHs) | | | | | | | |
| Green 1 | NCF (%) | | | | | | | |
| Green 2 | NCF (%) | | | | | | | |

5

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2

3 **Witness)** Nathaniel A. Berry

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 19)** *Refer to BREC's response to Staff's First Request, Item 43c.*

2 *a. The response gives the impression that BREC does not need to plan*
3 *for Non-Member sales. Explain what is the most cost efficient*
4 *approach to fulfilling Non-Member load obligations. Include in*
5 *the response the degree to which BREC's massive amount of excess*
6 *capacity being utilized by the Non-Member load obligations affects*
7 *its response.*

8 *b. Refer to BREC's response to Staff's First Request, Item 43c, page 3*
9 *of 4, lines 1-4.*

10 *(1) Explain how this paragraph addresses differences in the*
11 *tables.*

12 *(2) Since the Green unit conversions result in a slight reduction*
13 *in generation capacity from that provided by coal, explain*
14 *how the Green unit conversions allow BREC to retain*
15 *flexibility in the resource options to meet its long term needs.*

16 *c. Transmission losses necessitate additional resource requirements*
17 *to compensate for the losses. From the explanation, it is not clear*

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 *why transmission losses should not have been included in the base*
2 *case as part of the forecasted resource requirements. Provide*
3 *additional explanation.*

4
5 **Response)**

6 a. Big Rivers does plan for Non-Member sales, but including additional
7 long-term resources in such a plan is not the most cost-efficient approach
8 to fulfilling such obligations.

9 The study period for Big Rivers' 2020 Integrated Resource Plan
10 ("IRP") is 2024 through 2043. The contracts with Big Rivers' three
11 Nebraska customers and Owensboro Municipal Utilities ("OMU") only
12 run through ■■■■■, while our agreement with the Kentucky Municipal
13 Energy Agency ("KYMEA") runs through ■■■■■. Including contracts with
14 relatively short lives in a twenty (20) year plan introduces an unnecessary
15 complication and would risk returning to a situation where Big Rivers
16 ends up with excess capacity if the contracts are not renewed.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 If Big Rivers' generating resources are not available to serve these
2 loads, the required capacity and energy can be purchased in the MISO
3 spot or bilateral markets. To ensure that Big Rivers would still make
4 positive margins on these contracts in light of the risk Big Rivers would
5 be taking on by relying on the market, Big Rivers would likely purchase
6 hedges to lock in the price of the power needed to serve these customers.

7 As discussed in Case No. 2021-00079, the cost to convert the Green
8 units to natural gas is nearly the same as the market option, but avoids
9 the risk of the market option and the need to purchase hedges.

10 Big Rivers does not have a massive amount of excess capacity being
11 utilized by the Non-Members' load obligations. Approximately [REDACTED]
12 of capacity is allocated to the OMU agreement and [REDACTED] of capacity
13 is allocated to the KYMEA agreement. The capacity requirements for the
14 Nebraska contracts are purchased in the Southwest Power Pool.

15 b.

16 (1) The Total Native System Energy Summary on page 35 of the Load
17 Forecast Study (Appendix A of Big Rivers' 2020 IRP), includes

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 transmission losses. Both transmission losses and Non–Member
2 requirements are included in the Total System Energy Forecast table
3 on page 41 of the Load Forecast Study. Table 8.7, Member Load
4 included in Base Case (page 154 of the IRP) does not include
5 transmission losses nor Non–Member requirements.

6 (2) The Green natural gas conversion in Case No. 2021-00079¹ is
7 modeled as a capacity hedge through 2029 with a cost nearly
8 identical to that of purchasing the capacity in the market, but
9 without incurring the market risk and volatility. Big Rivers still
10 retains flexibility in its long–term planning for selecting capacity
11 resources that provide optimal solutions that may or may not include
12 the Green natural gas units after 2029.

13 c. Transmission energy losses are accounted for financially in MISO
14 Locational Marginal Prices (LMP).

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2

3 **Witness)** Mark J. Eacret

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 20)** *Refer to BREC's response to Staff's First Request, Item 44a.*
2 *Explain why and how converting the two Green units to NGCC lowers the*
3 *inherent risk of securing capacity through the MISO market.*

4

5 **Response)** As explained in Big Rivers' Application in Case No. 2021-00079,¹ the
6 Green units cannot continue to operate as coal units so, without their conversion to
7 natural gas, the units will be retired. If the units are retired, Big Rivers will need
8 to purchase MISO capacity in either the bilateral capacity markets or the MISO
9 Planning Resource Auction until a viable alternative to the Green units is
10 identified. Many coal plants are facing the same environmental regulations as the
11 Green units and will be retired, putting upward pressure on capacity markets.
12 Converting the Green units to natural gas protects Big Rivers from that market
13 volatility because Big Rivers will no longer be required to make market purchases.

14

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2 **Witness)** Mark J. Eacret

3

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 21)** *Refer to BREC's response to Staff's First Request, Item 47, pages*
2 *5-6 of 6. It appears that multiple household and commercial electric*
3 *appliance categories, that are estimated to experience efficiency gains over*
4 *the forecast period, are not included in the econometric models.*

5 *a. Provide a list of the appliance categories that are included in the*
6 *BREC/Member residential survey, the appliance categories that*
7 *are not included in the models, the estimated saturation appliance*
8 *levels, and the average annual kWh of each category.*

9 *b. Explain whether collectively, they do not account for large*
10 *proportion of household energy consumption and, therefore, their*
11 *omission from the analysis does not represent a significant effect*
12 *on the forecasted energy and demand results.*

13

14 **Response)**

15 *a. The appliances and saturations from the Big Rivers/Member residential*
16 *survey are provided in the attachment to this response. More detailed*
17 *results can be found on the attachment provided in Big Rivers' response*

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 to Item 18 of the Commission Staff's First Request for Information. The
2 kWh values of appliances are not determined by the Big Rivers/Member
3 survey and, therefore, are not provided.

4 Air conditioning and electric heat appliances deserve individual
5 consideration due to their size and impact on total usage. While the
6 remaining appliances are not captured individually, the usage
7 contributions of all appliances are included in the models. The cooling
8 degree day variable measures the net sensitivity of load to cooling degree
9 days. While primarily driven by air conditioning, this would also include
10 contributions from any heat sensitive appliance, activity, or behavior.
11 Weather sensitive contributions from ceiling fans and dehumidifiers
12 would be captured in this variable. Weather sensitive load from other
13 equipment may also be captured here such as outdoor work sheds,
14 recreational, and agricultural or lawn activities. Contributions, or lack
15 thereof, from appliances inversely related to heat would also be captured
16 here. Electric stoves may be used less in warm weather as consumers opt
17 to grill out more. Similarly, the heating degree day variable includes

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 contributions from any appliance sensitive to cold weather. The non-
2 weather sensitive usage contributions from appliances are captured
3 within the January–December monthly binary variables in the modeling.
4 b. Please see Big Rivers’ response to sub–part a. The usage from all
5 appliances has been captured through the modeling. No usage has been
6 omitted from the forecasted energy or demand results.

7

8

9 **Witnesses)** Matthew S. Sekeres and

10 Steven A. Fenrick

11

Big Rivers Electric Corporation
Case No. 2020-00299
Appliance Categories in Big Rivers/Member Survey

| Electric Appliance Category | Saturation |
|-----------------------------|------------|
| Electric Heating | |
| Ductless Heat Pump | 0% |
| Electric Baseboard | 1% |
| Ground/Water Heat Pump | 1% |
| Other | 1% |
| Radiant Heat | 1% |
| Not Sure | 2% |
| Dual Fuel Heat Pump | 2% |
| Electric Furnace | 16% |
| Standard Heat Pump | 22% |
| Air Conditioning | |
| Central AC | 92% |
| Window Unit(s) | 11% |
| Ductless HVAC/Heat Pump | 3% |
| Room Unit(s) | 15% |
| No AC | 0% |
| Water Heating | |
| Electric Tankless | 1% |
| Electric | 69% |

Big Rivers Electric Corporation
Case No. 2020-00299
Appliance Categories in Big Rivers/Member Survey

| Electric Appliance Category | Saturation |
|------------------------------|------------|
| Household Appliance | |
| Waterbed Heater | 2% |
| Hospital Grade Med. Equip. | 5% |
| Air Purifier | 9% |
| Whole House Fan | 10% |
| Dehumidifier | 17% |
| Well / Water Pump | 18% |
| Large Power Shop Tools | 20% |
| Freezer (Stand Alone) | 67% |
| Electric Cook Top | 72% |
| Dishwasher | 74% |
| Electric Oven | 81% |
| Ceiling Fan | 91% |
| Electric Clothes Dryer | 93% |
| Clothes Washer | 97% |
| Refrigerator | 98% |
| Microwave | 99% |
| Uninterrupted Power Supply | 2% |
| Electric Outdoor Grill | 3% |
| Hot Tub or Sauna | 4% |
| Corded Yard Trimmer | 9% |
| Swimming Pool Pump | 13% |
| Corded Leaf Blower | 14% |
| Portable Generator | 20% |
| Household Electronics | |
| Computer | 80% |
| Television | 93% |
| Full Size Vacuum Cleaner | 43% |
| Power Tools | 68% |
| Lawn Equipment | 29% |
| Gas / Electric Hybrid Car | 5% |
| Electric Car | 0% |
| Electric Lawn Mower | 2% |

Big Rivers Electric Corporation
Case No. 2020-00299
Appliance Categories in Big Rivers/Member Survey

| Electric Appliance Category | Saturation |
|---------------------------------|------------|
| Energy Savings and Conservation | |
| At Least One CFL Bulb | 31% |
| At Least One Incandescent Bulb | 64% |
| At Least One LED Bulb | 69% |

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 22)** *Refer to BREC's response to Staff's First Request, Item 48c.*
2 *Explain whether the price variable is the only variable in log form in the*
3 *regression equation. If so, explain why that is appropriate and*
4 *mathematically show how the regression equation was derived such that*
5 *only a single variable is in log form.*

6

7 **Response)** The price variable is the only variable in log form in the regression
8 equation. This is due to the assumption that price and electricity use have a non-
9 linear relationship. Logging the price variable produces a price elasticity estimate
10 that estimates the percentage reduction in electricity use for every percentage point
11 the price variable increases. The other variables are assumed to not have this same
12 relationship with electricity use and, thus, are not logged. Adding one more cooling
13 degree day ("CDD") or heating degree day ("HDD") is assumed to have the same
14 percentage impact on electricity use regardless of the current levels of CDDs and
15 HDDs.

16

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2 **Witnesses)** Matthew S. Sekeres and

3 Steven A. Fenrick

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 23)** *Refer to BREC's response to Staff's First Request, Item 51.*

2 *a. Refer to Items 51a and 51b(3). Explain whether there was missing*
3 *or inconsistent data for each of the Member systems and what is*
4 *meant by "customer values."*

5 *b. Refer to Item 51c. A 15-year weather normalization period appears*
6 *to be shorter than many periods chosen by other utilities to fully*
7 *capture weather effects on energy and demand. It is still not clear*
8 *why a 15-year period was judged to be the appropriate weather*
9 *normalization time interval. The response seems to indicate only*
10 *that additional work would have been needed to calculate a longer*
11 *time period and, that from an energy perspective, differences*
12 *between 10-, 15-, and 20-year intervals were minimal, and so a 15-*
13 *year period was chosen. There is no mention of demand impacts.*
14 *Explain why a 15-year weather normalization period was selected*
15 *and why it is judged to be superior to a 20 or 30 year normalization*
16 *period.*

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Response)**

2 a. There were periods of missing weather data at the primary weather
3 stations assigned to Big Rivers' Members' systems. This is normal when
4 gathering datasets of weather spanning many years. Where these
5 instances occur, backup weather stations are used to ensure a complete
6 and continuous dataset.

7 Clearspring sees no reference to "customer values" in Big Rivers'
8 response. Item 51 b(3) requests how variables were customized. The
9 model for each Member contains customized or unique weather values
10 corresponding to the Members' different weather station assignments.
11 While the weather stations, and therefore weather readings, are different
12 across each Member system because of their different geographical
13 locations, the mathematical equations used to develop the weather
14 variables are identical.

15 b. The use of fifteen (15) years of weather data to form averages was judged
16 to be similar to and on par with other durations. Additionally, longer
17 timeframes have concerns that 15-year timeframes do not have. As

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 stated in Big Rivers' response to Item 51c, an increased amount of
2 weather data would need to be taken from secondary and tertiary weather
3 stations. Also, the Big Rivers system peak load data was not readily
4 available for extended timeframes. This data is needed to create some of
5 the weather variables used in the models. These reasons, collectively,
6 contributed to fifteen (15) years being Clearspring's preferred choice for
7 the weather normalization period.

8

9

10 **Witnesses)** Matthew S. Sekeres and

11 Steven A. Fenrick

12

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 24)** *Refer to Direct Testimony of Michael T. Pullen in Case No. 2020-*
2 *00079³ at page 12, line 5, through page 13, line 6.*

3 *a. Confirm that MISO will include BREC's member load and any load*
4 *it has contracted to provide in a given period when calculating*
5 *BREC's Planning Reserve Margin Requirement (PRMR).*

6 *b. Explain why BREC contends that it can effectively analyze its*
7 *generation needs during the planning period without accounting*
8 *for all generation capacity it is obligated to provide during that*
9 *period, including portions thereof.*

10 *c. Confirm that BREC's evaluation of its generation capacity*
11 *requirements in its IRP is no longer valid given BREC's stated need*
12 *and intention to re-fire the Green units as proposed in Case No.*
13 *2021-00079, and if BREC is not able to confirm, please explain why*
14 *it is not able to do so.*

³ Case No. 2021-00079, *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* (filed Mar. 1, 2021), Application, Exhibit B.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Response)**

- 2 a. MISO's PRMR is required of Load Serving Entities with Coincident Peak
3 Demand in a Local Resource Zone, so Member load is included in Big
4 Rivers' Planning Reserve Margin Requirement as calculated by MISO.
5 Contracted Load outside the MISO footprint is not included by MISO in
6 Big Rivers' PRMR.
- 7 b. In its 2020 Integrated Resource Plan ("IRP"), Big Rivers evaluated its
8 generation needs to serve its native load requirements. Big Rivers
9 determined that it was not in its Members' best interest to consider the
10 short-term off-system sales contracts that end by 2029. To consider that
11 load over the entire IRP planning period would require Big Rivers to
12 provide generation resources that exceed its known requirements. As the
13 Commission knows, Big Rivers just recently successfully mitigated its
14 excess generation situation resulting from the departure of the smelters
15 from its system. Big Rivers does not believe it is in the Members' best
16 interest to knowingly go through a similar situation again.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 c. Not confirmed for the reasons stated in sub-part b. and Big Rivers'
2 response to Item 29 of the Commission Staff's Second Request for
3 Information.

4

5

6 **Witness)** Marlene S. Parsley (*a. only*) and

7 Michael T. Pullen (*b. and c. only*)

8

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 25)** *Provide BREC's projected PRMR, as that term is defined by*
2 *MISO, for MISO Zone 6 for each year from 2022-2023 through 2042-2043.*

3

4 **Response)** MISO annually calculates the Planning Reserve Margin Requirement
5 per Asset Owner per Local Resource Zone as:

6 50/50 Load Forecast Demand Peak Coincident with MISO Peak *times*

7 (1+ Transmission Loss Percentage) *times*

8 (1+ Planning Reserve Margin in Unforced Capacity set by Loss of Load
9 Expectation Studies).

10 Big Rivers' most recent forecast of the annual requirement is included in the table
11 on the next page. Note that [REDACTED]

12 [REDACTED].

13

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

| Big Rivers Electric Corporation Most Recent Forecast of Annual PRMR | |
|--|------------------------------|
| Planning Year | Total MISO PRMR (MWs) |
| 2022 | |
| 2023 | |
| 2024 | |
| 2025 | |
| 2026 | |
| 2027 | |
| 2028 | |
| 2029 | |
| 2030 | |
| 2031 | |
| 2032 | |
| 2033 | |
| 2034 | |
| 2035 | |
| 2036 | |
| 2037 | |
| 2038 | |
| 2039 | |
| 2040 | |
| 2041 | |
| 2042 | |

2

BIG RIVERS ELECTRIC CORPORATION
ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299

Response to Commission Staff's
Second Request for Information
dated April 16, 2021

May 11, 2021

1

2

3 **Witness)** Mark J. Eacret

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 26)** *Provide the Zonal Resource Credits (ZRCs), separately for each*
2 *facility, BREC will receive from MISO for the D.B. Wilson Plant (Wilson*
3 *Station), the natural gas fired turbine at Reid Station (Reid CT), BREC's*
4 *stake in hydroelectric capacity from SEPA, and each of the three solar PPAs*
5 *in each year from 2022-2023 through 2042-2043 using MISO's current*
6 *Business Practice Manual, and separately under any proposed changes and*
7 *projected changes to the manner in which MISO calculates ZRCs, if any,*
8 *and explain any proposed changes and projected changes to the calculation*
9 *of ZRCs.*

10

11 **Response)** Please see the table in the attachment to this responses for ZRC's
12 projected utilizing MISO's Resource Adequacy Business Practice Manual BPM-011-
13 r24 Appendix H ("BPM"), and also utilizing Effective Load Carrying Capability
14 ("ELCC") method for solar resources. Big Rivers is not able to quantify any other
15 projected changes to the calculation of ZRC's by MISO.

16

17

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2

3 **Witness)** Mark J. Eacret

4

**Big Rivers Electric Corporation
Projected Zonal Resource Credits (ZRCs)**

| Planning Year | Existing Resources | | | Solar ¹ | | | | | |
|---------------|--------------------------|---------------------|------------------------|-----------------------------|------------------------------|---------------------------------|----------------------------------|---------------------------------|---|
| | D. B. Wilson ZRC's (BPM) | Reid CT ZRC's (BPM) | SEPA Hydro ZRC's (BPM) | CES Meade Solar ZRC's (BPM) | CES Meade Solar ZRC's (ELCC) | CES McCracken Solar ZRC's (BPM) | CES McCracken Solar ZRC's (ELCC) | National Grid Solar ZRC's (BPM) | National Grid Solar ZRC's (ELCC) ² |
| 2022 | 384 | 58 | 178 | | | | | | |
| 2023 | 404 | 57 | 178 | 31 | 13 | 49 | 20 | | |
| 2024 | 396 | 56 | 178 | 33 | 13 | 49 | 19 | 116 | 50 |
| 2025 | 396 | 56 | 178 | 32 | 12 | 49 | 18 | 115 | 49 |
| 2026 | 396 | 56 | 178 | 32 | 12 | 48 | 18 | 115 | 47 |
| 2027 | 396 | 56 | 178 | 32 | 11 | 48 | 17 | 114 | 46 |
| 2028 | 396 | 56 | 178 | 32 | 11 | 48 | 17 | 113 | 44 |
| 2029 | 396 | 56 | 178 | 32 | 11 | 48 | 16 | 112 | 43 |
| 2030 | 396 | 56 | 178 | 32 | 10 | 47 | 16 | 111 | 42 |
| 2031 | 396 | 56 | 178 | 31 | 10 | 47 | 15 | 111 | 40 |
| 2032 | 396 | 56 | 178 | 31 | 10 | 47 | 15 | 41 | 15 |
| 2033 | 396 | 56 | 178 | 31 | 10 | 47 | 14 | 41 | 14 |
| 2034 | 396 | 56 | 178 | 31 | 9 | 47 | 14 | 41 | 14 |
| 2035 | 396 | 56 | 178 | 31 | 9 | 46 | 14 | 40 | 14 |
| 2036 | 396 | 56 | 178 | 31 | 9 | 46 | 13 | 40 | 13 |
| 2037 | 396 | 56 | 178 | 31 | 9 | 46 | 13 | 40 | 13 |
| 2038 | 396 | 56 | 178 | 30 | 8 | 46 | 13 | 40 | 13 |
| 2039 | 396 | 56 | 178 | 30 | 8 | 45 | 12 | 39 | 12 |
| 2040 | 396 | 56 | 178 | 30 | 8 | 45 | 12 | 39 | 12 |
| 2041 | 396 | 56 | 178 | 30 | 8 | 45 | 12 | 39 | 12 |
| 2042 | 396 | 56 | 178 | 30 | 8 | 45 | 11 | 39 | 11 |

¹ Solar resources utilizing current MISO BPM Methodology, and utilizing Effective Load Carrying Capability calculations from IHS Markit North American Power Market Outlook – November 2019.

² [REDACTED]

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 27)** *Provide the ZRCs BREC will receive from MISO for its portion*
2 *of the NGCC it intends to propose when it is placed in service using MISO's*
3 *current Business Practice Manual, and separately under any proposed*
4 *changes and projected changes to the manner in which MISO calculates*
5 *ZRCs, if any, and explain any proposed changes and projected changes to*
6 *the calculation of ZRCs.*

7

8 **Response)** Please see the table on the next page for ZRC's projected utilizing
9 MISO's Resource Adequacy Business Practice Manual BPM-0110r24 ("BPM"). Big
10 Rivers is not able to quantify any other projected changes to the calculation of
11 NGCC ZRC's by MISO.

12

13

14

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

| Big Rivers Electric Corporation Projected ZRCs | |
|---|------------------------|
| Planning Year | NGCC ZRCs - BPM |
| 2022 | |
| 2023 | |
| 2024 | 86 |
| 2025 | 86 |
| 2026 | 86 |
| 2027 | 86 |
| 2028 | 86 |
| 2029 | 86 |
| 2030 | 86 |
| 2031 | 86 |
| 2032 | 86 |
| 2033 | 86 |
| 2034 | 86 |
| 2035 | 86 |
| 2036 | 86 |
| 2037 | 86 |
| 2038 | 86 |
| 2039 | 86 |
| 2040 | 86 |
| 2041 | 86 |
| 2042 | 86 |

2

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1

2

3 **Witness)** Mark J. Eacret

4

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 28)** *Identify and explain the extent to which BREC will have*
2 *insufficient ZRCs to meet its PRMR for MISO Zone 6 if the re-fired Green*
3 *units are taken out of service at the end of useful life of seven years BREC*
4 *proposed in Case No. 2021-00079 even if with Wilson Station, Reid CT,*
5 *BREC's stake in the hydroelectric capacity from SEPA, the solar PPAs, and*
6 *BREC's share in the NGCC it intends to propose.*

7

8 **Response)** Big Rivers' optimal plan is to find willing partners for the 592 MW
9 Natural Gas Combined Cycle ("NGCC") unit, and will only take the Green units out
10 of service at the end of seven (7) years if they no longer operate economically.
11 Several factors may affect whether those units are no longer needed, including the
12 price of fuel, market prices, internal load growth or decline, changes in the MISO
13 Planning Reserve Margin, MISO's accreditation methods (especially
14 implementation of Effective Load Carrying Capability ("ELCC") for solar),
15 extension of Big Rivers' existing full requirements contracts, other long-term
16 contracts that bring value to Big Rivers' Member-Owners, *etc.* Any temporary
17 shortage will be made up with bilateral or MISO market purchases of capacity.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 Nevertheless, the table shown on Attachment A to this response includes
2 details of Big Rivers' projected length assuming removal of Green after 2028, and
3 with Wilson Station, Reid CT, SEPA hydropower, solar PPAs (using ELCC method
4 of accreditation), and the proposed share of NGCC. An alternate scenario is
5 presented in the table shown on Attachment B to this response. That alternate
6 scenario includes Big Rivers' proposed share of NGCC being implemented later,
7 with Green Unit 1 and Unit 2 remaining on line, which allows additional time for
8 negotiating, planning, construction of the NGCC plant, as well as the possibility of
9 additional load growth or contracts that bring value to Big Rivers' Member-Owners.

10

11

12 **Witness)** Mark J. Eacret

13

| Big Rivers Electric Corporation Projected Zonal Resource Credits (ZRCs), Big Rivers' Obligations (MWs) and ZRCs Excess (Short) | | | | | | | | | | | |
|---|--------------------------|---------------------|------------------------|--|------------------|-----------------------------------|-----------------------|---------------------------------------|-----------------|-------------------------------------|---------------------------------|
| Planning Year | D. B. Wilson ZRC's (BPM) | Reid CT ZRC's (BPM) | SEPA Hydro ZRC's (BPM) | Combined Solar ZRC's (BPM / ELCC) ¹ | NGCC ZRC's (BPM) | Green Unit 1 & Unit 2 ZRC's (BPM) | Total Portfolio ZRC's | Net Non-Member Sales Obligation (MWs) | MISO PRMR (MWs) | Total Obligation (MWs) ² | Portfolio ZRC Excess Or (Short) |
| 2022 | 384 | 58 | 178 | 0 | 0 | 373 | 993 | | | | |
| 2023 | 404 | 57 | 178 | 81 | 0 | 373 | 1,092 | | | | |
| 2024 | 396 | 56 | 178 | 82 | 86 | 373 | 1,169 | | | | |
| 2025 | 396 | 56 | 178 | 79 | 86 | 373 | 1,167 | | | | |
| 2026 | 396 | 56 | 178 | 77 | 86 | 373 | 1,164 | | | | |
| 2027 | 396 | 56 | 178 | 74 | 86 | 373 | 1,162 | | | | |
| 2028 | 396 | 56 | 178 | 72 | 86 | 373 | 1,159 | | | | |
| 2029 | 396 | 56 | 178 | 70 | 86 | | 785 | | | | |
| 2030 | 396 | 56 | 178 | 68 | 86 | | 782 | | | | |
| 2031 | 396 | 56 | 178 | 65 | 86 | | 780 | | | | |
| 2032 | 396 | 56 | 178 | 39 | 86 | | 754 | | | | |
| 2033 | 396 | 56 | 178 | 38 | 86 | | 753 | | | | |
| 2034 | 396 | 56 | 178 | 37 | 86 | | 752 | | | | |
| 2035 | 396 | 56 | 178 | 36 | 86 | | 751 | | | | |
| 2036 | 396 | 56 | 178 | 35 | 86 | | 750 | | | | |
| 2037 | 396 | 56 | 178 | 34 | 86 | | 749 | | | | |
| 2038 | 396 | 56 | 178 | 34 | 86 | | 748 | | | | |
| 2039 | 396 | 56 | 178 | 33 | 86 | | 748 | | | | |
| 2040 | 396 | 56 | 178 | 32 | 86 | | 747 | | | | |
| 2041 | 396 | 56 | 178 | 31 | 86 | | 746 | | | | |
| 2042 | 396 | 56 | 178 | 30 | 86 | | 745 | | | | |

¹ Solar Accreditation using BLM method through 2023, ELCC method estimated to being in 2024.

² [REDACTED]

| Big Rivers Electric Corporation Projected Zonal Resource Credits (ZRCs), Big Rivers' Obligations (MWs) and ZRCs Excess (Short) | | | | | | | | | | | |
|---|--------------------------|---------------------|------------------------|--|------------------|-----------------------------------|-----------------------|---------------------------------------|-----------------|-------------------------------------|---------------------------------|
| Planning Year | D. B. Wilson ZRC's (BPM) | Reid CT ZRC's (BPM) | SEPA Hydro ZRC's (BPM) | Combined Solar ZRC's (BPM / ELCC) ¹ | NGCC ZRC's (BPM) | Green Unit 1 & Unit 2 ZRC's (BPM) | Total Portfolio ZRC's | Net Non-Member Sales Obligation (MWs) | MISO PRMR (MWs) | Total Obligation (MWs) ² | Portfolio ZRC Excess Or (Short) |
| 2022 | 384 | 58 | 178 | 0 | 0 | 373 | 993 | | | | |
| 2023 | 404 | 57 | 178 | 81 | 0 | 373 | 1,092 | | | | |
| 2024 | 396 | 56 | 178 | 82 | 0 | 373 | 1,084 | | | | |
| 2025 | 396 | 56 | 178 | 79 | 0 | 373 | 1,081 | | | | |
| 2026 | 396 | 56 | 178 | 77 | 0 | 373 | 1,079 | | | | |
| 2027 | 396 | 56 | 178 | 74 | 0 | 373 | 1,076 | | | | |
| 2028 | 396 | 56 | 178 | 72 | 0 | 373 | 1,074 | | | | |
| 2029 | 396 | 56 | 178 | 70 | 86 | 373 | 1,158 | | | | |
| 2030 | 396 | 56 | 178 | 68 | 86 | 373 | 1,155 | | | | |
| 2031 | 396 | 56 | 178 | 65 | 86 | 373 | 1,153 | | | | |
| 2032 | 396 | 56 | 178 | 39 | 86 | 373 | 1,127 | | | | |
| 2033 | 396 | 56 | 178 | 38 | 86 | 373 | 1,126 | | | | |
| 2034 | 396 | 56 | 178 | 37 | 86 | 373 | 1,125 | | | | |
| 2035 | 396 | 56 | 178 | 36 | 86 | 373 | 1,124 | | | | |
| 2036 | 396 | 56 | 178 | 35 | 86 | 373 | 1,123 | | | | |
| 2037 | 396 | 56 | 178 | 34 | 86 | 373 | 1,122 | | | | |
| 2038 | 396 | 56 | 178 | 34 | 86 | 373 | 1,121 | | | | |
| 2039 | 396 | 56 | 178 | 33 | 86 | 373 | 1,121 | | | | |
| 2040 | 396 | 56 | 178 | 32 | 86 | 373 | 1,120 | | | | |
| 2041 | 396 | 56 | 178 | 31 | 86 | 373 | 1,119 | | | | |
| 2042 | 396 | 56 | 178 | 30 | 86 | 373 | 1,118 | | | | |

¹ Solar Accreditation using BLM method through 2023, ELCC method estimated to being in 2024.

² [REDACTED]

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 29)**

2 *a. Explain how a decision by the Commission granting BREC's*
3 *request for a Certificate of Public Convenience and Necessity*
4 *(CPCN) to re-fire the Green units would change BREC's projections*
5 *in the IRP regarding its generation needs.*

6 *b. Explain how a decision by the Commission denying BREC's request*
7 *for a CPCN to re-fire the Green units would change BREC's*
8 *projections in the IRP regarding its generation needs.*

9

10 **Response)**

11 a. A decision granting Big Rivers' request for a CPCN to re-fire the Green
12 units would not change Big Rivers' conclusions in the IRP regarding its
13 generation needs. Big Rivers still believes that participating in a
14 partnership in a Natural Gas Combined Cycle ("NGCC") plant is the
15 least-cost option for Big Rivers' long-term capacity needs. Converting
16 the Green units to natural gas is a low-cost, low-risk way to defer that
17 need until the end of the decade.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 b. A decision denying Big Rivers' request for a CPCN to re-fire the Green
2 units would not change Big Rivers' conclusions in the IRP regarding its
3 generation needs. Big Rivers still believes that participating in a
4 partnership in an NGCC plant is the least-cost option for Big Rivers'
5 long-term capacity needs. If the Green units are not converted to natural
6 gas, Big Rivers will purchase capacity in the bilateral markets and the
7 MISO Planning Resource Auction until partners can be identified and an
8 NGCC built.

9
10

11 **Witness)** Mark J. Eacret

12

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 30)** *When analyzing the size of any stake BREC needs in the NGCC*
2 *it intends to propose and the timing of any such need, state what useful life*
3 *BREC anticipates using for the re-fired Green units and explain why.*

4

5 **Response)** Please see my Direct Testimony in Case No. 2021-00079¹ in which Big
6 Rivers, based on current wholesale market price and capital cost information,
7 proposes and supports an economic useful life of seven (7) years for the conversion
8 of the Green Station units from coal-fired to natural gas.

9

10

11 **Witness)** Paul G. Smith

12

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 31)** *State whether BREC has had any discussions with OMU or*
2 *KYMEA regarding whether they intend to renew their contracts upon*
3 *expiration or otherwise have an interest in continuing to obtain generation*
4 *from BREC, and describe the current state of such discussions.*

5

6 **Response)** See Big Rivers' responses to Item 18 of the Commission Staff's First
7 Request for Information, and to Item 3 of the Attorney General's Supplemental
8 Data Requests, in Case No. 2021-00079.¹

9

10

11 **Witness)** Mark J. Eacret

12

¹ See *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 filed March 1, 2021.

BIG RIVERS ELECTRIC CORPORATION

**ELECTRONIC
2020 INTEGRATED RESOURCE PLAN OF
BIG RIVERS ELECTRIC CORPORATION
CASE NO. 2020-00299**

**Response to Commission Staff's
Second Request for Information
dated April 16, 2021**

May 11, 2021

1 **Item 32)** *Explain whether BREC has performed a study how average*
2 *usage compares to usage for low-income customers.*

3

4 **Response)** Big Rivers has not performed any studies differentiating usage
5 relative to income.

6

7

8 **Witness)** Russell L. Pogue

9