Big Rivers
ELECTRIC CORPORATION

Your Touchstone Energy® Cooperative

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF	**)**	
BIG RIVERS ELECTRIC CORPORATION	**)**	**Case No.**
FOR APPROVAL OF SOLAR POWER	**)**	**2020-00183**
CONTRACTS	**)**	

DIRECT TESTIMONY

OF

MARK EACRET
VICE PRESIDENT ENERGY SERVICES

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: June 24, 2020

DIRECT TESTIMONY

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DIRECT TESTIMONY

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I. INTRODUCTION

Q. Please state your name, business address, and position.

A. My name is Mark J. Eacret. I am employed by Big Rivers Electric Corporation ("*Big Rivers*" or the "*Company*"), 201 Third Street, Henderson, Kentucky 42420, as Vice President Energy Services. I report to Robert W. Berry, President and Chief Executive Officer.

Q. Please describe your job responsibilities.

A. As Vice President Energy Services, I am responsible for long-term energy and capacity marketing and short-term energy hedging activities at Big Rivers. I am also responsible for coordination of daily Midcontinent Independent System Operator, Inc. ("*MISO*") commercial market activities that include unit offer strategy, interface with ACES Power Marketing, and oversight of the market awards process. A staff of six professionals report to me. Other responsibilities include scheduling Southeast Power Administration ("*SEPA*") energy and capacity, the Company's tri-annual Integrated Resource Plan,

contract management, interface with the MISO Independent Market Monitor, and performing a variety of official roles within the MISO structure.

Q. Briefly describe your education and work experience.

A. I graduated from Indiana University–Purdue University in Indianapolis with a Bachelor of Science in Accounting and from Indiana University with a Master of Business Administration with a concentration in Finance. I was employed by CINergy and its predecessor companies from 1980 to 1991 in the accounting function and, beginning in 1991, in the wholesale power function managing the analytical support for the company's wholesale marketing and trading functions. From 1999 through 2013, I worked with Ameren Corp where initially my team and I provided analytical support to the company's marketing and trading functions. In 2007, I assumed the additional responsibility of Controller for Ameren's merchant generation operation, Ameren Energy Resources ("*AER*"). In 2011, I became AER's Controller and Vice President of Business Services. Following Ameren's 2013 sale of its merchant generation function, I moved to Sunflower Electric Power Corporation ("*Sunflower*") in January 2014, as the Senior Manager of Market Operations and Power Contracts. At Sunflower, I was part of the team that transitioned Sunflower into the Southwest Power Pool's ("*SPP*") Integrated Market. I assumed my current position with Big Rivers in April 2015.

Q. Have you previously testified before this Commission?

A. Yes. I testified on behalf of Big Rivers in Case No. 2019-00269.[1] I sponsored responses to information requests in Case No. 2016-00278,[2] Case No. 2017-00384,[3] and Case No. 2020-00064.[4] I have also offered direct testimony in Fuel Adjustment Clause reviews, including Case No. 2019-00007.[5] My professional experience is summarized in Exhibit Eacret-1.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to describe the process through which Big Rivers elected to issue a Request for Proposals ("*RFP*") for solar power purchase agreements ("*PPAs*") and chose the successful respondents. I also describe Big Rivers' economic analysis of the PPAs and the benefits the PPAs provide to Big Rivers and its Members.

[1] *In the Matter of: Electronic Application of Big Rivers Electric Corporation for Enforcement of Rate and Service Standards*, Case No. 2019-00269.

[2] *In the Matter of: Application of Big Rivers Electric Corporation for a Declaratory Order*, Case No. 2016-00278.

[3] *In the Matter of: 2017 Integrated Resource Plan of Big Rivers Electric Corporation*, Case No. 2017-00384.

[4] *In the Matter of: Electronic Application of Big Rivers Electric Corporation for Approval to Modify Its MRS Tariff, Cease Deferring Depreciation Expenses, Establish Regulatory Assets, Amortize Regulatory Assets, and Other Appropriate Relief*, Case No. 2020-00064.

[5] *In the Matter of: Electronic Examination of The Application of the Fuel Adjustment Clause of Big Rivers Electric Corporation from November 1, 216 Through October 31, 2018*, Case No. 2019-0007.

Q. Will you be sponsoring any exhibits?

A. Yes. I am sponsoring the following exhibits:

Exhibit Eacret-1:	Professional Summary
Exhibit Eacret-2:	The Request for Proposals (RFP) which Big Rivers issued on June 3, 2019
Exhibit Eacret-3:	Complete list of RFP responses
Exhibit Eacret-4:	NRCO Notes from July 23 Meeting
Exhibit Eacret-5:	Position Summary
Exhibit Eacret-6:	Henderson ("*Unbridled Solar*") Area Map
Exhibit Eacret-7:	Henderson Solar Milestones
Exhibit Eacret-8:	Geronimo Economic Impact Flyer
Exhibit Eacret-9	Newspaper Article regarding Sale of Property to Henderson Solar
Exhibit Eacret-10:	Meade Solar Aerial Map
Exhibit Eacret-11:	McCracken Solar Aerial Map
Exhibit Eacret-12:	Plexos Modeling Assumptions
Exhibit Eacret-13:	Forward Curve Development
Exhibit Eacret-14:	ELCC Document
Exhibit Eacret-15:	Economic Benefit Calculation

II. OVERVIEW

Q. Briefly describe the contracts for which Big Rivers is seeking approval.

A. Big Rivers has entered into three power purchase agreements to purchase the output of three solar facilities for twenty years (the "*Solar Contracts*"). The first is an agreement with Henderson Solar, LLC to purchase the entire 160 MW output from a facility to be located on the Henderson/Webster County line just south of Henderson, Kentucky. The second is an agreement with Meade County Solar, LLC to purchase the entire 40 MW output from a facility to be located in Meade County, Kentucky. The third is an agreement with McCracken County Solar, LLC to purchase the entire 60 MW output from a facility to be located in McCracken County, Kentucky. In all three cases, Big Rivers will receive all of the energy, capacity, renewable energy certificates, and ancillary services produced by the facilities whose cumulative output totals 260 MW.

Q. What prompted Big Rivers' Request for Proposals for solar generation options?

A. As fully discussed in the Direct Testimony of Robert W. Berry in Case No 2019-00365, [redacted]

[redacted][6]

To comply with the Nucor agreement, Big Rivers issued an RFP on June 3, 2019 (Exhibit Eacret-2) to start the competitive bidding process for a solar PPA. The RFP requested a start date between December of 2022 and December of 2025 to roughly align with the projected start date of the Nucor contract. The twenty-year term requested [redacted], as well as the full-requirements contracts with our Members, which expire on December 31, 2043.

Q. How will Big Rivers utilize the solar PPAs in relation to the Nucor contract?

A. [redacted], the 260 MW solar purchase would serve as a hedge of approximately [redacted] of the energy and [redacted] of the capacity required to serve Nucor [redacted]. [redacted].

[6] See *In the Matter of: Joint Application of Big Rivers Electrical Corporation and Meade County Rural Electric Cooperative Corporation for Approval of Contracts for Electric Service with Nucor Corporation and Application of Big River's Electric Corporation for Approval of Tariff* Case No. 2019-00365. Application Testimony of Robert W. Berry at 5-6.

III. REQUEST FOR PROPOSALS PROCESS

Q. Please describe Big Rivers' RFP.

A. The National Renewables Cooperative Organization ("*NRCO*") issued Big Rivers' RFP June 3, 2019. The RFP requested proposals for up to 150 MW with a preference for locations within the Big Rivers' footprint and flat pricing for twenty-year terms. Big Rivers would receive all attributes of the solar projects, including energy, capacity, ancillary services, and environmental attributes. The RFP requested firm 12x24 generation shapes, with commercial operation dates between December 31, 2022, and December 31, 2025. The RFP requested that respondents provide detailed information on development status and site description, the capacity and energy profile, technical description and data, operations and maintenance, pricing methodology and information, transmission and interconnection, financing and credit arrangements, references, and the project team. Responses were due by June 28, 2019.

Q. **Please explain the role NRCO played in Big Rivers' RFP process.**

A. NRCO is headquartered in Carmel, Indiana, and works on behalf of its 23 member-owner cooperatives, including Big Rivers. In addition to sharing its extensive knowledge of the renewable industry and the evolving technologies, NRCO assists its members in originating and negotiating renewable power

purchase agreements. Since 2010, NRCO's members have secured over 2 GW of solar and wind generation through competitive requests for proposals across the U.S.

Big Rivers is a founding member of the NRCO and benefits from this membership through access to renewable project information and studies. For example, each year NRCO receives several hundred utility-scale wind and solar proposals from renewable developers and meets with its members to review the market information.

Q. **How was the RFP distributed?**

A. The 2019 Solar Energy Supply Request for Proposals was distributed to potential developers on behalf of Big Rivers Electric by NRCO on June 3, 2019, with a proposal due date of June 28, 2019. The RFP was sent out with a draft of the Big Rivers RFP Non-Disclosure Agreement and a Solar RFP project Spreadsheet. The documents were disseminated via email to a list of forty-five solar developers identified by NRCO as active in the area and developers who had contacted Big Rivers' staff expressing interest in developing solar resources in Western Kentucky.

Q. **Please describe the response Big Rivers received to the RFP**.

A. Of the forty-five (45) firms, thirty-nine (39) expressed initial interest and of those, fifteen (15) developers submitted a total of twenty-six (26) individual project proposals. Within the scope of the twenty-six (26) sites proposed, there were fifty-two (52) distinct PPA offers, thirty-six (36) of which were located in Kentucky. See Exhibit Eacret-3 for a complete list of responses.

Q. **Please describe the process that was used to evaluate the responses.**

A. The initial evaluation to reduce the overall list of proposed projects to an extended shortlist was completed July 23, 2019. See Exhibit Eacret-4, which presents notes from the July 23 meeting and the rationale used to create the first short list of fourteen projects from eight developers, which represented twenty-four unique PPA offers.

Additional questions were sent to the short list RFP participants on August 6th seeking clarification or further detail for individual proposals. The focus of the questions included:

- PPA term
- Network upgrade cost
- Interconnection agreement and modeling
- Location on the transmission grid
- Output guarantee
- ITC safe harbor
- Developer business model
- Equipment selection
- Project construction schedule

- Site control
- Development history
- Capacity flexibility
- Local taxes

During this time, ACES' transmission group provided analysis examining hourly MISO local marginal price ("*LMP*") congestion between the short-listed solar projects and the BREC.BREC load node. Given the very close proximity of all but one of the short-listed offers to Big Rivers' load region and transmission system, the model results returned very little basis spread between the projects and BREC.BREC, and were in line with expectations.

Based on the responses from the short-list developers and the ACES transmission modeling results, the short-list was reduced to three developers:

- Community Energy Solar ("*CES*")
- Geronimo Energy ("*Geronimo*")
- [redacted]

Most of the projects that were removed from consideration were at the high end of the price range in the initial short list or raised their price after their initial proposal. A few were non-responsive to our second round of questions, frequently regarding network upgrade or interconnection costs.

CES and Geronimo were selected to proceed to PPA development and [redacted] was asked to provide a redline version of the PPA, but was kept in

consideration in the event negotiations with the other two developers were not successful.

Q. Did Big Rivers conduct meetings with any of the screened bidders?

A. Yes. NRCO staff met with several of the developers on behalf of Big Rivers, and phone inquiries about the RFP were numerous and passed on to NRCO staff for follow up. The only physical meetings, which took place during the RFP process, were with the two final developers during the latter part of PPA negotiations.

Big Rivers' staff and in house counsel, along with NRCO staff NRCO's attorney met at the Big Rivers office on the following dates:

CES	January 27, 2020
Geronimo	January 28, 2020.

Q. Were there any significant changes to the proposals that arose during contract negotiation?

A. Yes, the original Geronimo proposal was for purchase of 100 MW. During negotiation, Big Rivers found that Geronimo intended to build a larger 160 MW facility and offer the output for sale to others. Big Rivers had multiple concerns with Geronimo contracting with an unknown counterparty in connection with the same solar facility, so we negotiated a lower price and exclusivity in exchange for increasing the size of our purchase.

Q. Is there anything unique about the Community Energy Solar proposal?

A. CES proposes to provide two smaller sites connected at a sub-transmission level at the cost of one large site connected at the transmission level. This provides several benefits to the transmission system. Interconnection at sub-transmission level reduces line and transformer losses and reduces exposure to congestion-related system upgrades. It spreads the economic benefits (property taxes and employment) across Member territories and diversifies LMP basis risk. Additionally, geographic risk (cloud cover) is diversified and the approach establishes a presence across the Big Rivers footprint.

IV. DECISION TO PURCHASE ADDITIONAL SOLAR ENERGY

Q. [redacted], how did Big Rivers choose 260 MW as the aggregate size of the purchase?

A. Our base analysis shows that the value of the energy, capacity, and renewable energy certificates received under these power purchase agreements is higher than the fixed purchase price. This is supported by the resource planning models, which will simply continue to select the solar projects [at the fixed contract price] regardless of the scenarios, because the

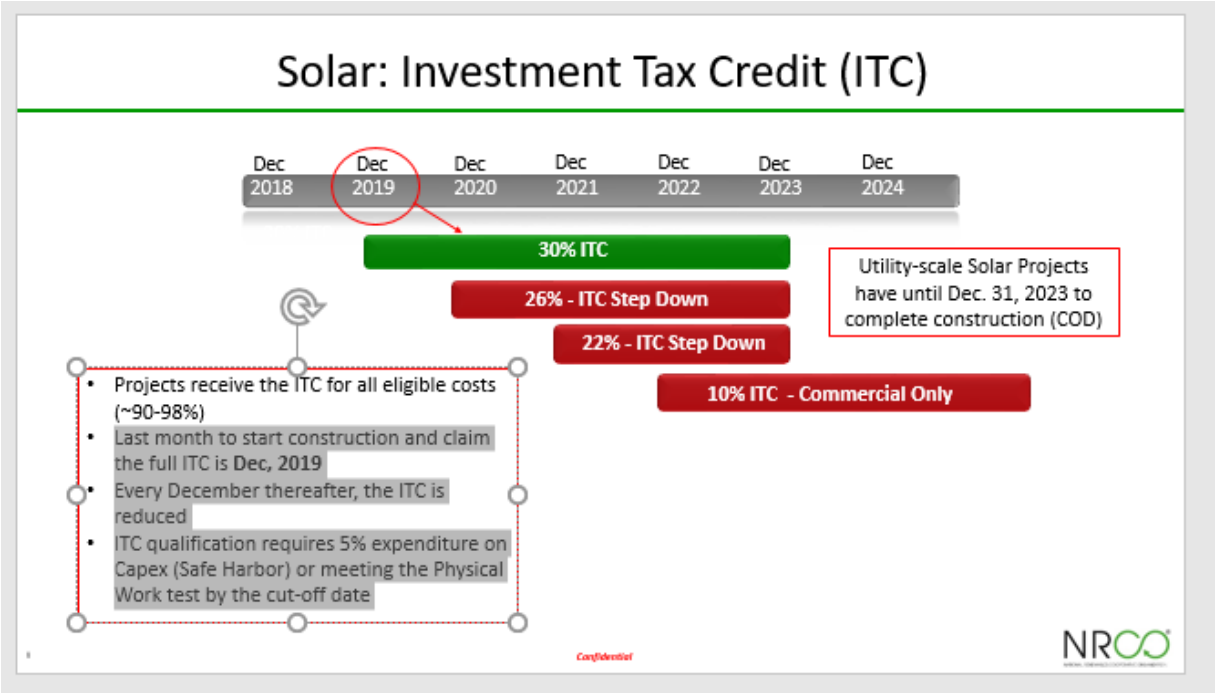
benefits will continue to reduce our Members' costs. The resource planning models are more fully discussed below.

In addition, the long-term Big Rivers strategy is to move towards a balanced supply portfolio. Only a few years ago, the Big Rivers generation fleet was nearly 90% coal on a capacity basis and more than that on an energy basis. This large position in coal created a huge exposure for our Members to environmental regulation. The constant change in these regulations complicated management of our business.

The retirement of our Coleman Generating Station, Reid Unit 1, and the exit from our power purchase agreement with Henderson Municipal Power and Light, create an opportunity for Big Rivers to build a more balanced portfolio. The addition of 260 MW of solar to a portfolio that already includes coal, natural gas, and hydro moves us in that direction without over-exposing us to the risks associated with any one generation type.

An additional consideration is the current status of the Investment Tax Credit ("*ITC*") on solar. As shown below, the last month to start construction and claim the full ITC was December 2019. Every December thereafter, the ITC is reduced. Utility scale projects must be completed by December 31, 2023. ITC qualification requires 5% expenditure on Capex (Safe Harbor) or meeting the Physical Work test by the cut-off date. Both

Geronimo and CES will be in commercial operation before December 31, 2023, and meet the Safe Harbor test.



While the U.S. government could always choose to extend the deadline, absent such an extension, the annual reduction in the ITC will put upward pressure on solar prices, which puts a premium on acting now rather than later.

From a capacity perspective, assuming approval of the Nucor contract and excluding the solar PPAs, Big Rivers will be short from [redacted]. When Big Rivers' power sales contract with Owensboro Municipal Utilities ("*OMU*") expires, Big Rivers will be long by about [redacted] when Big Rivers' power sales contract with KyMEA contract expires. That length depends on no

renewal of the OMU or KyMEA contracts and no significant growth in Member load after Nucor. It also assumes strong performance and no retirement of either Wilson or the Green units. See Exhibit Eacret-5 for a presentation of the Big Rivers position through 2032. The Big Rivers Integrated Resource Plan, which will be filed with the Commission in September of 2020, will provide a more detailed analysis of Big Rivers' supply and demand and alternatives.

From a capacity perspective, the solar PPAs would add only about 150 zonal resource credits ("*ZRCs*") in 2029 under the current MISO Business Practice Manual ("*BPM*") and only 68 MW under MISO's proposed Effective Load Carrying Capability ("*ELCC*") approach. Either of those two figures are reduced [redacted]. Given the uncertainty of our post-2029 position, these are reasonable levels of length.

From an energy perspective, the output of the solar facilities becomes economic energy the cost of which, when reduced by the value of capacity and environmental attributes, is very attractive. Again, assuming Commission approval of the Nucor contract, Big Rivers' Member load will be approximately 4.2M MWh. The solar PPAs will provide a little under 600,000 MWh of energy. This energy will complement our existing fleet, not duplicate it.

Q. Why limit the aggregate size of the solar purchase to 260 MW?

A. There were two factors placing limits on the size of our solar purchase. First, in testimony before Congress, John Bear, the Chief Executive Officer of MISO, noted the following:

> In anticipation of continued change, MISO is working to identify and understand the impact of increased reliance on renewables. Already, we have learned that renewable penetration of 30% would challenge our ability to maintain the planning reserve margin and operate the system within acceptable voltage and thermal limits. Maintaining reliability at the 40% renewable level becomes significantly more complex.[7]

The total Big Rivers load in 2024, when the three proposed solar facilities will be in commercial operation, is projected to be 876 MW (assuming Commission approval of the Nucor contract). Thirty percent of that figure is 263 MW. If improvements in generation or transmission technology in the future facilitate additional economic renewable generation on the grid, Big Rivers can evaluate it at that time.

Second, the long-term Big Rivers strategy is to move towards a balanced supply portfolio. The addition of 260 MW of solar to a portfolio that already includes coal, natural gas, and hydro moves us in that direction

[7] See Testimony of John Bear Chief Executive Officer MISO (October 30, 2019) at : https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/Written%20Testimony_30Oct2019_JBear.pdf

without over-exposing us to the risks associated with any one generation type.

V. THE SOLAR CONTRACTS

A. Henderson Solar Contract

Q. Who is Geronimo Energy, LLC?

A. Geronimo Energy, LLC, a National Grid company, is a leading North American renewable energy development company based in Minneapolis, Minnesota, with satellite offices located throughout multiple states in the regions where it develops, constructs, and operates. As a farmer-friendly and community driven company, Geronimo develops projects for corporations and utilities that seek to repower America's grid by reigniting local economies and reinvesting in a sustainable future. Geronimo has developed over 2,400 megawatts of wind and solar projects that are either operational or currently under construction, resulting in an investment of over $4 billion in critical energy infrastructure and the revitalization of rural economies. Geronimo has a vast development pipeline of wind and solar projects in various stages of development throughout the United States. Henderson Solar, LLC is a wholly owned subsidiary of Geronimo Energy, LLC.

Q. Briefly summarize the significant terms of the Henderson Solar contract.

A. Under the terms of the Henderson Solar contract, Big Rivers will purchase all of the output of a 160 MW facility at a fixed price of $29.60/MWh. Big Rivers will be responsible for 50% of network upgrade costs, which are expected to be less than one million dollars total. The output will include capacity, energy, ancillary services, and any environmental rights such as renewable energy or carbon credits. The commercial operation date is expected to be before [redacted]. Henderson Solar, LLC will be required to provide appropriate credit support. Energy output is expected to be about [redacted] and performance is guaranteed at [redacted] of the average expected output over a [redacted] period. Big Rivers will act as the Market Participant within MISO system.

Q. **What conditions precedent are included in the contract?**

A. Among other conditions precedent, the contract is contingent upon approval from the Rural Utilities Service and the Kentucky Public Service Commission (Section 2.1).

Q. Is there a take-or-pay provision in each of the Henderson Solar Contract and if so, please describe the provision(s).

A. No. Big Rivers' contractual obligation to pay is based upon the actual receipt of output at a specified point of delivery and the payment amount is determined by the amount of output delivered.

Q. Is there a capacity payment associated with the contracts?

A. No. There is no capacity payment. The Contract Price is an all-inclusive energy-only price for the solar energy products. Payment is only made for energy delivered to Big Rivers. If the facility does not produce due to forced outages, scheduled maintenance outages, cloud cover, or other reasons, then Big Rivers does not pay.

Q. Does the PPA create any operation or maintenance obligations for Big Rivers?

A. None in regards to the Solar Facility itself. Big Rivers will serve as Market Participant.

Q. What obligations will Big Rivers have as Market Participant?

A. Big Rivers will offer the energy from the facility into the MISO market each day and shadow-settle expected MISO energy, capacity, and ancillary services revenues.

Q. Where is the location of the proposed solar facility, including the number of approximate acres to be used?

A. The Henderson Solar facility, which has been named Unbridled Solar project, is located on 1,700 acres on the Henderson/Webster County line. See Exhibit Eacret-6 for a map with the precise location.

Q. Will the Henderson Solar Facility be a Kenergy customer?

A. Yes, the facility will be a Kenergy customer for power which cannot be produced on site, such as lighting.

Q. Describe the proposed solar facility and how the energy will be transmitted via the existing transmission infrastructure.

A. The Unbridled Solar project will be located near Robards, Kentucky, on a 1,700 acre site and will produce 160 MW(ac). [redacted].

Q. **Please describe the construction plans and timeline for the solar facility**.

A. A construction timeline is provided as Exhibit Eacret-7.

Q. **Are there any expected benefits to the Henderson/Webster County area for this project?**

A. Per Geronimo, during development, the Unbridled Solar Facility represents an investment of approximately $250 million and will create 150 construction and related service jobs. During this period, Geronimo expects to spend approximately $100,000 on sponsorships, marketing, travel, meals, legal fees, office, county records, local engineering, and environmental consulting services. During operation, Geronimo expects five full-time jobs, a $32,000 annual contribution to a local education fund, and about $160,000 annually in tax revenues. Almost seventy-five percent of those tax revenues will go to local schools. See Exhibit Eacret-8 for a Geronimo flier on local benefits.

Additionally, Governor Beshear approved a land purchase required by the project on June 16, 2020. The sale improved the marketability of a Henderson County economic development site and provided funds for the local economic development board to make improvements to the remainder of

the site, to make it even more attractive to future economic development candidates (see Exhibit Eacret-9).

Q. **Who will own the solar facilities?**

A. The facility will be built, owned, and operated by Henderson Solar, LLC.

B. Community Energy Contracts

i. Meade County Solar Contract and McCracken County Solar Contract

Q. Who is Community Energy Solar?

A. Community Energy Solar has developed and financed 2,000 MW of renewable energy projects across the country, including 1,300 MW of solar power. CES combines power marketing and development expertise to build renewable generation economically and at scale and has been a leading renewable energy developer for 20 years, developing many of the first and largest wind and solar projects in the United States. CES is headquartered in Radnor, Pennsylvania, with offices in Boulder, Colorado, and Chapel Hill, North Carolina. Meade County Solar, LLC and McCracken County Solar, LLC are wholly owned subsidiaries of CES. For more information about CES, please visit https://www.communityenergyinc.com.

Q. Briefly summarize the significant terms of the CES contracts.

A. Under the terms of the Meade County Solar Contract, Big Rivers will purchase all of the output of a 40 MW facility. Big Rivers will pay a fixed price of $27.30/MWh. Big Rivers will be responsible for any interconnection costs above $300,000. The output will include capacity, energy, ancillary services, and any environmental rights such as renewable energy certificates or carbon credits. The commercial operation date is expected to be around [redacted]. CES will be required to provide appropriate credit support. Energy output is expected to be about [redacted]. Performance is guaranteed at [redacted] of the average expected output over a [redacted] period. Big Rivers will act as the Market Participant within MISO.

Under the terms of the McCracken County Solar Contract, Big Rivers will purchase all of the output of a 60 MW facility. Big Rivers will pay a fixed price of $27.30/MWh. Big Rivers will be responsible for any interconnection costs above $300,000. The output will include capacity, energy, ancillary services, and any environmental rights such as renewable energy certificates or carbon credits. The commercial operation date is expected to be around [redacted]. CES will be required to provide appropriate credit support. Energy output is expected to be about [redacted], and performance is

guaranteed at [redacted] of the average expected output over a [redacted] period. Big Rivers will act as the Market Participant within MISO.

Q. Will the CES facilities be Jackson Purchase Energy and Meade County RECC customers?

A. Yes, the CES facilities will be customers of Jackson Purchase Energy and Meade County RECC for power which cannot be produced on site, such as lighting.

Q. What conditions precedent are included in the CES contracts?

A. Among other conditions precedent, the contracts are contingent upon approval from the Rural Utilities Service and the Kentucky Public Service Commission (Section 2.1).

Q. Is there a take-or-pay provision in each of the CES contracts?

A. No, Big Rivers' contractual obligation to pay is based upon the actual receipt of output at a specified point of delivery, and the payment amount is determined by the amount of output delivered.

Q. Is there a capacity payment associated with the contracts?

A. No, there is no capacity payment. The Contract Price is an all-inclusive energy-only price for the solar energy products. Payment is only made for energy delivered to Big Rivers. If the facility does not produce due to forced outages, scheduled maintenance outages, cloud cover, or other reasons, then Big Rivers does not pay.

Q. Do the CES contracts create any operation or maintenance obligations for Big Rivers?

A. None in regards to the solar facilities themselves. Big Rivers will serve as the MISO Market Participant and Asset Owner.

Q. What obligations will Big Rivers have as Market Participant and Asset Owner?

A. Big Rivers will offer the energy from the facility into the MISO market each day and shadow-settle expected MISO energy, capacity, and ancillary services revenues.

Q. Where are the locations of the proposed solar facilities, including the number of approximate acres to be used?

A. The Meade County facility will be located on approximately 400 acres in Meade County, Kentucky. The McCracken County facility will be located on approximately 600 acres in McCracken County, Kentucky. See Exhibits Eacret-10 and Eacret-11 for maps with the precise locations.

Q. Describe the proposed solar facilities and how the energy will be transmitted via the existing transmission infrastructure.

A. Each of the proposed facilities will interconnect with existing Big Rivers sub-transmission facilities at the following locations.

- The McCracken County site will be located near Kevil, Kentucky, on 600 acres. The facility will produce 60 MW(ac) and interconnect to the Shell 69kV line using a pole-mounted switch.
- Meade County site will be located near Flaherty, Kentucky, on 400 acres, generate 40 MW(ac), and interconnect at one of two following potential points:
    - Flaherty Tap – Flaherty 69kV line with a pole-mounted switch
    - Custer – Flaherty Tap 69kV line with a pole-mounted switch.

Q. Please describe the construction plans and timeline for the solar facilities.

A. See Exhibit 2.2 of the Power Purchase Agreements for the project milestones.

Q. Are there any expected benefits to Meade/McCracken County areas from these projects?

A. Yes. According to CES, during construction each project will generate about 150 jobs. These will be mostly no-previous-experience type jobs, which means they will be accessible to a wide range of workers. The local flood of workers during construction will buy food, gas, and sundries from local businesses. The projects will also subcontract with local trades, typically electricians, earthmoving, landscaping, and fencing.

Once operational, each solar farm will pay significant property taxes starting at between $100,000 and $150,000 per year. By comparison, the taxes currently paid on the proposed solar farm sites amounts to less than $5,000 per year. Unlike new taxes for residential development, this increase in taxes will not be offset by new expenses related to schools, water, sewer, etc.

Q. Who will own the solar facilities?

A. The solar facilities will be built, owned, and operated by Community Energy Solar's subsidiaries Meade County Solar, LLC and McCracken County Solar, LLC.

VI. RESOURCE PLANNING MODELS

Q. What resource planning models did Big Rivers use to evaluate the solar PPAs?

A. Big Rivers utilized our in-house production cost model, PLEXOS 8.2 R01. Big Rivers' optimal amount of solar capacity addition was determined using the LT Plan (long-term capacity expansion planning optimization model). The LT Plan model uses advanced algorithms that analyze possible portfolio options based on the inputs and constraints and provide the optimal quantity and timing of solar additions. The LT Plan objective was to minimize the net present value ("*NPV*") of the capital and production cost formulated as a mixed-integer problem. The optimum option selected is the least-cost option for that unique input and constraint parameter.

Q. What was the purpose of running the resource planning models as part of Big Rivers' analysis?

A. The model was run to validate the results that we were seeing in our separate economic analysis.

Q. What were the model results?

A. For reasons described above, Big Rivers limited the amount of purchased solar that the model could choose to 300 MW. In the base case, the model chose [redacted]. If the 300 MW limit were removed from the base case, the model keeps choosing solar until the maximum reserve margin is reached, then adds more solar when it can for load growth. See Exhibit Eacret-12 for a description of the modeling assumptions, constraints, and scenarios used.

VII. BENEFITS TO BIG RIVERS' MEMBERS (Economic Analysis)

Q. Please describe the economic value of the solar transactions.

A. Under the terms of the agreements, Big Rivers receives the net energy output of the facilities, capacity rights, ancillary services, and environmental attributes. Environmental attributes means any and all claims, credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled,

resulting from the avoidance of the emission of any gas, chemical, or other substance to the air, soil or water, which are deemed of value by Buyer. This includes renewable energy certificates and carbon credits, should a market for carbon credits develop.

While Big Rivers is entitled to any ancillary services revenues produced by the facilities, we do not expect those revenues to be significant and have assumed them to be zero in our analysis.

Big Rivers will treat the net energy output of the facility as a purchase of economic energy. The energy price paid will be adjusted by the MISO revenues received for that energy along with proceeds from capacity rights, ancillary services, and environmental attributes. Therefore, the value to our Members can be calculated as:

> Avoided MISO Purchases + Capacity Revenues + Ancillary Services Revenues + Revenues from Environmental Attributes – PPA Expenses

Paul Smith discuss the income statement and fuel adjustment clause implications of the PPAs in his direct testimony.

Q. Please describe how avoided MISO purchases were estimated.

A. Every five minutes, across MISO, thousands of locational marginal prices (LMP's) are calculated. This represents the price that a load will pay or a generator will receive at a specific location in MISO. The MISO purchases

that Big Rivers avoids will be the product of the LMP at Big Rivers load output of the solar facility.

To estimate the LMP at Big Rivers load during the hours when the solar facility is generating, Big Rivers started with a twenty-year Indiana Hub ("*IndyHub*") forward curve. IndyHub represents an average of LMP's across central Indiana and is the most liquid trading point within MISO. See Exhibit Eacret-13 for a description of how the twenty-year forward curve is developed.

The forward prices assume a fixed quantity in all hours for an entire year. However, the solar facility obviously will generate a quantity that varies hourly and seasonally, during on-peak hours only and weighted toward the middle of the day and the summer months. See Exhibit A in each Solar Contract for a generation profile. To calculate a load-weighted price, Big Rivers created an adjustment factor by taking historical (2017-2019) hourly IndyHub LMPs and weighting them by the generation profiles for each PPA. Using this approach, the IndyHub around-the-clock forward price were increased by 11.8% for Henderson Solar, 9.0% for CES McCracken County, and 8.8% for CES Meade County.

The IndyHub LMP must also be adjusted for the differences between LMP's in Central Indiana and Western Kentucky (basis). To do so, Big Rivers compared IndyHub prices for 2017-2019 to the LMP that Big Rivers

paid for its load over the same period and created an adjustment factor. That factor reduces the IndyHub price by -5%.

The total avoided MISO purchases for each year were then calculated by multiplying the IndyHub forward price, after load weighting and basis adjustment, by annual generation from the Exhibit A generation profiles. Note that Geronimo (Henderson Solar) estimates that annual generation will degrade by approximately .4% and Community Energy Solar estimates annual degradation of .5%.

Q. Please describe how capacity revenues were estimated.

A. In MISO, Zonal Resource Credits (ZRCs) are the unit of measure for capacity. See my response in Case No. 2019-00269 to Item 21 of the Commission Staff's First Request for Information for a more detailed definition of ZRCs. According to the current MISO Business Practices Manual (BPM): 4.2.3.5.1, Solar Capacity Credit Solar photovoltaic (PV) resources will have their annual UCAP value determined based on the 3 year historical average output (with curtailments added to the actual output) of the resource for hours ending 15, 16, and 17 EST for the most recent Summer months (June, July, and August). Market Participants will need to supply this historical data to MISO by October 31 of each year in order to have their UCAP value determined. Market Participants will use the template found on the MISO

website (Planning > Resource Adequacy (Module E) > Planning Resource Auction) to submit the 3 year historical average output data. Solar PV resources that are new, upgraded or returning from extended outages shall submit all operating data for the prior Summer with a minimum of 30 consecutive days, in order to have their capacity registered with MISO. Resources with less than 30 days of metered values would receive the class average of 50% for its Initial Planning Year. Refer to Appendix V of the BPM for additional examples.

Based upon this approach, the quantity of ZRCs for each of the PPAs will be 50% of nameplate for the first planning year and then the projected generation for hours 15-17 for the months of June through August thereafter. Based upon the generation profiles in Exhibit A of each contract, that would be [redacted].

The quantity of ZRCs is then multiplied by the MISO capacity forward curve for each year. The bilateral capacity forward market in MISO is very thin and information on long-term capacity sales is hard to obtain. In April of 2019, while working on an economic development project, Big Rivers received an offer of [redacted]. In September of 2019, Big Rivers received an offer for [redacted].

Additionally, based upon newspaper accounts, Paducah Power System ("*PPS*") made a ten-year sale of capacity to the Kentucky Municipal Power Agency ("*KyMEA*") in 2017 for $3.70/kw-month (approximately $5.08 per MWh). KyMEA issued a Request for Proposals and received dozens of responses before awarding the contract to PPS. Historically, over the ten MISO planning years from 2014-2023, Big Rivers has sold 2,379 MW-years of capacity to fourteen different counterparties across at least five states at a weighted average price of $2.21/kw-month. For its evaluation, Big Rivers used $2.00/kw-month and then a sensitivity at $1.00/kw-month.

Q. Beyond the uncertainty around the forward curve, is there any other risk in that calculation?

A. Yes, MISO is examining a concept called Effective Load Carrying Capability ("*ELCC*") for determining the ZRC value assigned to renewable resources. Under that approach, the quantity of ZRC's credited to the facilities under the PPA would be reduced by about 50%. See Exhibit Eacret-14. As another sensitivity, Big Rivers calculated the value of the capacity associated with the solar facilities using the ELCC approach.

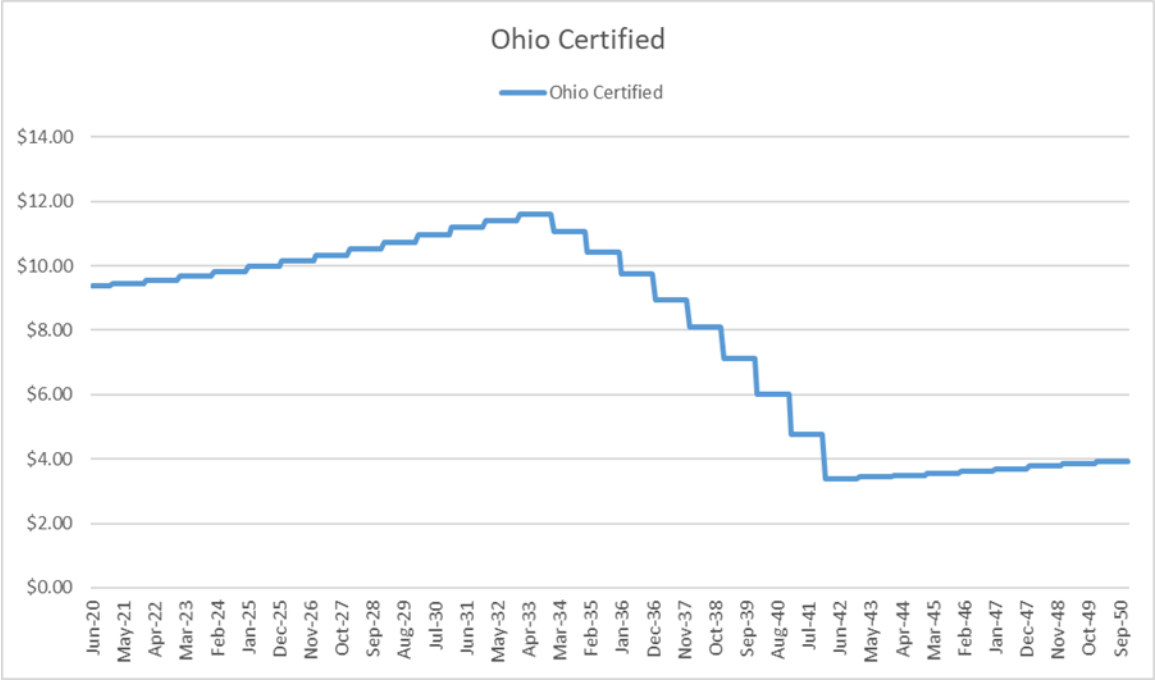
Q. Please describe what a Renewable Energy Certificate is and how its value was determined for your calculation of Member value from the solar PPAs

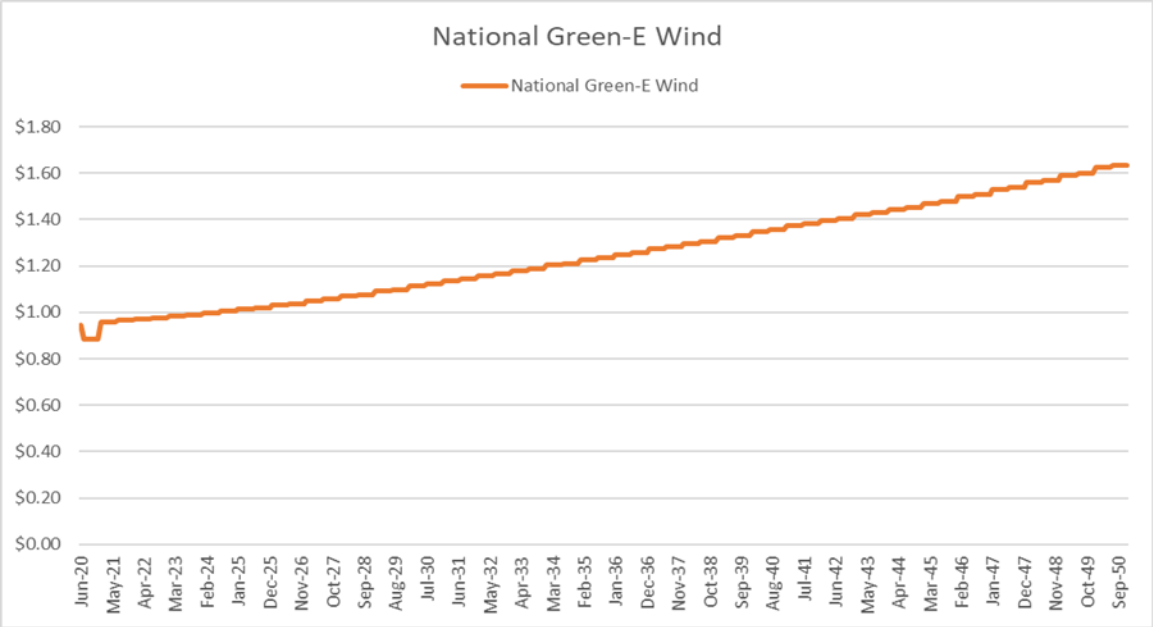
A. A Renewable energy Certificate ("*REC*") is a certificate corresponding to the environmental attributes of energy produced from renewable sources such as wind or solar. RECs were created as a means to track progress towards and compliance with states' Renewable Portfolio Standards ("*RPS*").

Renewable Energy Certificates are one of two primary outputs from generation of new power from renewable sources. Renewable power generation creates actual power in the form of electricity, and environmental attributes in the form of RECs. The RECs are sold as a commodity into the marketplace. While RECs are not actually a measure of power, each REC represents one megawatt hour (MWh) of renewable energy generated. For each REC purchased, the purchaser is able to claim the equivalent MWh of energy reduction as on offset to their conventional energy use. Because RECs provide an additional revenue stream to renewable energy projects, they are essentially a subsidy meant to allow renewable resources to compete economically with non-renewable resources.

Q. Will Renewable Energy Certificates be sold from the projects to increase benefits to Member Owners?

A. Yes. The RECs from all Big Rivers solar PPAs will be sold in eligible markets such as the Ohio SREC market or the Green-e REC, which represent the two current markets for which the RECs are eligible. Below are forward price curves for both the Ohio and Green-e markets.





Because there is such a disparity in the two markets, Big Rivers used both to create a high and low scenario.

Q. Did Big Rivers include any value for carbon credits in its analysis?

A. No, not for this analysis. However, any value assigned to carbon credits would simply add to the value created for our Members.

Q. How are costs and benefits of the Solar PPAs allocated to [redacted]?

A. [redacted].

Q. What was the conclusion of this economic analysis?

A. The net present value of the benefit to our Members created by these solar contracts is between [redacted]. See Exhibit Eacret-15 for the calculations.

Q. Describe some of the additional benefits to the Members of Big Rivers from the solar PPAs.

A. Beyond the quantitative economic value, there are several other drivers of Member value. Other benefits include a response to the demand for renewable resources from economic development candidates, an answer to the Environmental Social Governance approach now being raised by the credit rating agencies (as more fully discussed in the Direct Testimony of Paul Smith at Page 6), the diversification of our solar portfolio over multiple sites across our footprint and multiple operators, and additional hedging of our [redacted].

Q. Are economic development candidates requesting renewable resources?

A. Yes. The Commission is aware of this and noted in its order in Case No. 2020-00016, "…the Commission agrees that renewable energy resources

should be available for corporations with sustainability goals as one of the economic development tools that convey that Kentucky is open for business."

Big Rivers has seen the demand for renewable energy rising. Over the past three years, Big Rivers has made proposals to approximately 50 economic development candidates. During the first half of that period, there were no specific requests for renewable energy sources. During the second half of the period, about 25% of all economic development candidates made some sort of request for or inquiry about renewable energy availability.

Q. Do the solar PPAs add diversity to the Big Rivers supply portfolio?

A. Yes, the solar PPAs add portfolio diversity in several ways. A "utility scale" solar project, generally 100 MW or greater, is required for the best prices. By increasing the size of our solar commitment, Big Rivers was able to use two different developers. While each developer is required to provide credit support for its commitment, using multiple developers spreads our construction, operation, and credit risk. It also provides some geographic (cloud cover) diversity. The solar facilities will be spread over the entire Big Rivers footprint, with almost two hundred miles separating the Meade and McCracken County facilities.

Q. Do the solar PPAs provide any price hedging benefits?

A. Yes, Big Rivers has [redacted]. Big Rivers can rely upon its existing generating assets to supply these loads, but the opportunity presented by these low-cost solar contracts allows Big Rivers to realize higher value for our Members.

Q. If approval were denied for the PPAs, how would this affect the Nucor project?

A. [redacted]. The solar contracts are also intended to reduce the risk to Big Rivers' Members by hedging the price risk of the energy delivered to Nucor [redacted]. While elimination of that hedge would not affect the Nucor project, it adds a risk to the Big Rivers Members.

Q. Does this conclude your testimony?

A. Yes.