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August 14, 2012

Jeff DeRouen
Executive Director
Public Service Commission
211 Sower Boulevard, P.O. Box 615
Frankfort, Kentucky 40602-0615

Re: *In the Matter of: Application of Big Rivers Electric Corporation for Approval of its 2012 Environmental Compliance Plan, for Approval of its Amended Environmental Cost Recovery Surcharge Tariff, for Certificates of Public Convenience and Necessity, and for Authority to Establish a Regulatory Account,* P.S.C. Case No. 2012-00063

Dear Mr. DeRouen:

Enclosed for filing on behalf of Big Rivers Electric Corporation ("Big Rivers") are an original and ten copies of Big Rivers' Rebuttal Testimony. A copy of this letter and a copy of the rebuttal testimony have been served on each of the persons on the attached service list.

Sincerely,

TAK

Tyson Kamuf

TAK/ej
Enclosures

cc: Albert Yockey
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BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, Robert W. Berry, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Robert W. Berry

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Robert W. Berry on this the 8 day of August, 2012.

Joy P Wright
Notary Public, Ky. State at Large
My Commission Expires_____

Notary Public, Kentucky State-At-Large
My Commission Expires: July 3, 2014
ID 421951

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, Thomas L. Shaw, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Thomas L. Shaw

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Thomas L. Shaw on this the 8 day of August, 2012.

Joy P. Wright
Notary Public, Ky. State at Large
My Commission Expires_____

Notary Public, Kentucky State-At-Large
My Commission Expires: July 3, 2014
ID 421951

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, Travis A. Siewert, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Travis A. Siewert

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by Travis A. Siewert on this the 8 day of August, 2012.

Joy P Wright
Notary Public, Ky. State at Large
My Commission Expires_____

Notary Public, Kentucky State-At-Large
My Commission Expires: July 3, 2014
ID 421951

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, John Wolfram, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

John Wolfram

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN TO before me by John Wolfram on this the 13th day of August, 2012.

Paula Mitchell
Notary Public, Ky. State at Large
My Commission Expires 1-12-13

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, Brian J. Azman, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Brian J. Azman

STATE OF INDIANA)
) SS:
COUNTY OF HAMILTON)

SUBSCRIBED AND SWORN TO before me by Brian J. Azman on this the 6th day of August, 2012.

Beth A. Burrows
Resident Of
Marion County
My Commission Expires:
8/24/2016

Beth A. Burrows, Notary Public

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, Patrick N. Augustine, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

Patrick N. Augustine

COMMONWEALTH OF VIRGINIA)
COUNTY OF FAIRFAX)

SUBSCRIBED AND SWORN TO before me by Patrick N. Augustine on this the 9 day of August, 2012.

Notary Public,
Commonwealth of Virginia
My Commission Expires June 30, 2013

#7251149

BIG RIVERS ELECTRIC CORPORATION

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT

CASE NO. 2012-00063

VERIFICATION

I, William DePriest, verify, state, and affirm that I prepared or supervised the preparation of my rebuttal testimony filed with this Verification, and that rebuttal testimony is true and accurate to the best of my knowledge, information, and belief formed after a reasonable inquiry.

William DePriest

STATE OF ILLINOIS)
COUNTY OF COOK)

SUBSCRIBED AND SWORN TO before me by William DePriest on this the 13 day of August, 2012.

OFFICIAL SEAL
LYDIA A JACKSON JOSHUA
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:01/18/15

Notary Public, Illinois
State at Large
My Commission Expires Jan 18, 2015

ORIGINAL

Big Rivers
ELECTRIC CORPORATION

Your Touchstone Energy® Cooperative

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN, FOR APPROVAL OF ITS AMENDED ENVIRONMENTAL COST RECOVERY SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

FILED: August 14, 2012

ORIGINAL

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

OF

ROBERT W. BERRY
VICE PRESIDENT, PRODUCTION

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
ROBERT W. BERRY

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

A. My name is Robert W. Berry. I am employed by Big Rivers Electric Corporation ("Big Rivers"), 201 Third Street, Henderson, Kentucky 42420, as the Vice President, Production.

Q. Did you submit direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club, and to provide a brief overview of the other witnesses filing rebuttal testimony on behalf of Big Rivers.

Q. Do KIUC and Sierra Club oppose all of Big Rivers' proposed plan?

A. No. Sierra Club appears to object to all of the plan in favor of Big Rivers retiring all of its units and replacing them with natural gas combined cycle ("NGCC") units, but KIUC only objects to Projects 4 and 5. KIUC does not oppose projects 6-11. See Direct Testimony of Philip Hayet at page 25, lines 14-15. Projects 4 and 5 are two of the four projects in Big Rivers' 2012 Environmental Compliance Plan to allow Big Rivers to comply with the

Cross State Air Pollution Rule ("CSAPR"). Project 4 is the Flue Gas Desulfurization ("FGD") project at Wilson Unit 1, and Project 5 is the Selective Catalytic Reduction ("SCR") project at Green Unit 2.

Q. Do the testimonies filed on behalf of KIUC and Sierra Club give you any concern about the Build Case being the best option?

A. No. The intervenors have not demonstrated that the Build Case is not the least cost option. The intervenors' testimonies rely only on faulty or immaterial allegations of error or speculation and innuendo, and Sierra Club's NGCC proposal is based on tenuous assumptions, is simply not feasible, and is not the least cost option.

Q. You say that the intervenors' allegations of error are faulty or immaterial. Can you be more specific?

A. Each of the persons filing rebuttal testimony on behalf of Big Rivers addresses one or more of the intervenors' allegations of error. The attached Exhibit Berry Rebuttal-1 lists each alleged error and the witness that addresses that alleged error.

Q. What is KIUC's position in its testimony?

A. KIUC's position appears to be that even though KIUC's analysis shows that the Build Case is the least cost option, the risks of the Build Case outweigh the risks and greater cost of the Buy Case.

Q. Do you agree that the risks of the Build Case outweigh the risks of the Buy Case?

A. Absolutely not. Big Rivers' Members desire low cost, reliable power. The Members are risk averse, thus they also desire stable pricing. While investing in the Build Case may have some potential risks, the certainty provided by the investment helps provide a more stable price to Big Rivers' Members. KIUC argues that flexibility is the greatest benefit of the Buy Case; however, if Big Rivers wishes to mitigate the risk of generation not being available and fluctuating market prices, Big Rivers will be forced to enter into longer-term purchase agreements in the Buy Case. If Big Rivers enters into longer-term purchase agreements, it then loses flexibility that may have been offered by the Buy Case. If Big Rivers purchases to mitigate the potential of market fluctuations, and one or both smelters exit, Big Rivers is then saddled with a purchase contract that it does not need. If Big Rivers accepts the market risk associated with the Buy Case, its Members will be subjected to a significant amount of market risk over a number of years.

Market prices could spike, and Big Rivers and its customers could be exposed to significant purchased power costs. Potential causes of market spikes include:

- Decreased capacity due to the shutdown of coal units to comply with environmental regulations.
- Increased cost of natural gas.

- Increased industrial demand and generation demand from fuel switching.
- Decreased supply because of environmental regulations on hydraulic fracturing/fracking.
- Decreased supply because of increased exports.

- Congestion charges within Big Rivers' footprint could significantly increase due to energy and load imbalances, particularly given the load concentration from having the two smelters within the Big Rivers service territory.

Additional risks of the Buy Case that KIUC ignored in its testimony include:

- If other utilities take KIUC's advice and purchase power instead of building pollution control equipment, there is a risk of the lack of availability of capacity in the Midwest Independent Transmission System Operator, Inc. ("MISO") footprint for Big Rivers to purchase to serve its load.

- The Buy Case presents reliability concerns for the MISO footprint and Big Rivers' footprint. Transmission reliability could be problematic if Big Rivers reduces generation and then loses one or more units. This could lead to line overloading, resulting in inability to serve or significant price increases.

- If the volume of power to meet Big Rivers' load demand is not available, Big Rivers could be at risk of not meeting its NERC requirement obligations, potentially resulting in significant fines for noncompliance.
- Big Rivers faces a risk of losing its emission allowance allocations if it shuts down plants to comply with CSAPR.
- Big Rivers may have difficulty meeting MISO reserve requirements under the Buy scenario.

KIUC argues that Big Rivers could also pursue the Build Case in the future. However, there are additional risks associated with waiting, such as:

- The availability of materials and labor could decrease and the cost of materials and labor could increase, especially as an increasing number of utilities begin constructing similar pollution control equipment.
- Interest rates on financing may be much higher in the future, resulting in significant annual negative cost impacts to Member rates.
- There is potential that EPA regulations could change, and Big Rivers may be unable to build to comply. New regulations could

grandfather existing units, and Big Rivers may run the risk of losing the grandfathered status by waiting to build.

- There may be coal contract concerns associated with the Buy Case. If Big Rivers shuts down units for a period of time and then decides to initiate the Build Case, coal prices could have sharply increased, and Big Rivers will be exposed to the full market risk of coal (as it may not have any long-term contracts in place).

KIUC's witnesses completely ignore the risks of the Buy Case and the risks of waiting to implement the Build Case. On the other hand, they attempt to discount the Build Case by assuming faulty and speculative risks.

Q. On page 17 of his testimony, Mr. Kollen claims that Big Rivers' analysis was flawed because it failed to reduce non-fuel production operating and maintenance ("O&M") expenses in the Buy Case. Is that correct?

A. No. In the Buy Case, Big Rivers' intent was to curtail generation in order to comply with the CSAPR allowed emissions variability limit across its fleet by choosing the highest emitting units and removing them from service during the period of the lowest expected market prices, and purchasing needed generation to fulfill load requirements from MISO. The Buy Case did not intend to permanently lay-up or decommission any of Big Rivers' generating units. The Buy Case did reduce Big Rivers' variable O&M costs

for fuel, reagents, disposal, etc., but the fixed O&M costs remained. Therefore, the selected units were only idled for one to three month stretches, and all of the generating equipment continued to be maintained. Although some corrective maintenance items may be reduced due to fewer operating hours, this small reduction in corrective maintenance is more than offset by protective maintenance procedures that would be required when generating units are idled for periods of thirty days or more. Protective maintenance items include maintaining a nitrogen blanket on the water/steam side of the boiler tubes, keeping the fire side of the boiler above ambient temperature dew point to prevent corrosion, circulating rust inhibiters throughout the feedwater and condensate systems, circulating dry filtered air through the turbines and generators, and stabilizing the lubricating oil in idled machinery. Additionally, increased starts and stops on base load designed generating units tend to increase fixed maintenance costs, not reduce costs.

Q. On page 16 of his testimony, Mr. Kollen claims that Big Rivers' analysis was flawed because it failed to include the costs to retire the existing FGD at Wilson in its analysis of the Build Case. Is that correct?

A. No. Due to the layout of the Wilson power plant, Big Rivers will not be required to physically remove the existing Wilson FGD when installing the replacement FGD system. Big Rivers will be required to remove small

sections of inlet ductwork to make the tie in to the new FGD. The remainder of the FGD can be left in place until such time that Big Rivers decides to physically remove it from site. As removal is not required by the Build Case, it was proper to exclude any costs associated with removal.

Q. On pages 20 and 21 of her testimony, Ms. Wilson argues that Big Rivers' load forecast was overstated because it did not include the effects of demand-side management ("DSM"), and that as a result, Big Rivers' units are projected to run more often than they otherwise would have. Is that correct?

A. No. As a member of MISO, Big Rivers sells all of the power it generates to MISO, and purchases all of the power it uses to serve its load from MISO. So, Big Rivers generates power based on the market price of power, and Big Rivers' load is thus not related to the amount of power Big Rivers generates.

Q. Do you believe Big Rivers can achieve the 1% annual savings in retail sales suggested by Sierra Club through cost effective DSM programs?

A. No. Given that 67% of Big Rivers' load is due to the smelters and that the smelters are not required to participate in Big Rivers' DSM programs, Big Rivers is not aware of any cost effective DSM programs or combinations of programs that would enable it to achieve the 1% annual savings in retail sales suggested by Sierra Club, and especially not the 10% savings over a

decade Sierra Club suggests. Given the current cost concerns expressed repeatedly by the smelters, one would expect they have taken numerous steps to minimize their electrical usage already. While Big Rivers fully supports the development of energy efficiency and DSM programs within its territory and has developed and will continue to evaluate energy efficiency and DSM programs that will assist its Members in reducing their consumption, the fact remains, given Big Rivers' load profile, DSM and energy efficiency measures will not offer energy savings substantial enough to impact Big Rivers' environmental compliance options.

Q. On page 25 of her testimony, Ms. Wilson alleges that Big Rivers' analysis was flawed because it failed to include the parasitic load in the Build Case associated with the environmental equipment. Is that correct?

A. No. As stated in my direct testimony, the Sargent & Lundy study did not include calculating actual auxiliary power consumption for the recommended compliance strategies. Detailed engineering for each project will have to be completed before actual power consumption can be determined, but Big Rivers believes it will be insignificant. Ms. Wilson offered nothing to show otherwise.

Also, the Sargent & Lundy study did include estimated auxiliary power use in its additional O&M projections. Based on the Sargent &

Lundy estimates, the impact of parasitic load from the Big Rivers units by project is listed in the table below:

Project No. 4 – Wilson FGD	1.3 MW[1]
Project No. 5 – Green SCR	1.8 MW
Project No. 6 – Reid Gas Conversion	0 MW
Project No. 7 – Add Pumps @ HMP&L	0.40 MW
Project No. 8 – Coleman ACI	0.28 MW
Project No. 9 – Wilson ACI	0.19 MW
Project No. 10 – Green ACI	0.30 MW

With the Wilson FGD effectively cancelled out, the total estimated parasitic load for the Build Case is 2.97 MW or 22,115 MWh per year when operating at 85% capacity factor. The total annual parasitic load divided by the 12.5 million megawatt hours of annual generation that is projected in the Build Case between 2013 and 2026 equals .0017 or less than two tenths of one percent. Big Rivers considers this insignificant in the analysis.

Q. On page 30 of her testimony, Ms. Wilson says that Big Rivers' analysis was flawed because it allegedly failed to model the proposed emission control retrofits against a reasonable set of alternative options. Do you agree with Ms. Wilson?

[1] The Wilson unit currently operates a scrubber that it will shut down when the new scrubber is built, effectively cancelling the 1.3 MW of additional parasitic load projected.

A. No. Big Rivers considered many alternatives to comply with CSAPR and the Mercury and Air Toxics Standards ("MATS"). When evaluating different alternatives it quickly becomes obvious that some of the alternatives are so extreme that they do not require a detailed analysis. Because of the significant number of generating units involved and the significant unamortized plant balance of the coal units that are being upgraded, retirement of the coal plants or converting them to natural gas would result in the need to recover the unamortized plant balances of the coal plants in addition to any costs of converting the plants to natural gas through rates to our customers. While Big Rivers must also recover unamortized plant balances in the Build Case, Big Rivers believed that total costs could be reduced by pursuing upgrades that would control emissions and comply with EPA regulations for an average cost of about $169 per kW compared to an overnight installed cost of $626 per kW for an advanced combustion turbine and $917 per kW for a new combined cycle unit (Assumptions to the Annual Energy Outlook for 2011, DOE EIA, p. 101). These differences were so large that Big Rivers did not consider it necessary to evaluate the option of retiring coal plants or converting them to natural gas. Additionally, as explained in the rebuttal testimony of Travis Siewert, retiring Big Rivers' coal units would cause Big Rivers to have to immediately repay its existing debt, which it would not be able to do without borrowing, and Big Rivers would be unable to borrow funds to

repay that debt without the coal units as collateral (not to mention being unable to borrow the additional funds necessary to build the NGCC units). Market purchases were considered in the Buy Case; however, this option produced unfavorable results on a net present value basis compared to the Build Case. As previously explained, the Buy Case is a high-risk option.

Energy efficiency and renewable sources were also considered, but they will not provide the volume of load reductions required to meet the CSAPR regulation. Big Rivers would need to achieve a 24% reduction in its capacity factor to meet the CSAPR regulation. This would be a tall order to achieve based on energy efficiency and renewable, particularly when 67% of the portfolio is not required to participate in the DSM programs. Thus, Big Rivers considered numerous alternatives, but because they were obviously not going to result in a least cost option, no further analysis was required. It is easy to offer baseless observations, as Ms. Wilson does, that Big Rivers could benefit from DSM, for example, but it is also easy to reject options that have no reasonable chance of being a relatively low cost, low risk option.

Q. On page 26 of her testimony, Ms. Wilson argues that Big Rivers' analysis was flawed because it used a constant heat rate. Do you agree?

A. No. In her testimony, Ms. Wilson only mentions generating unit components degrading over time causing a gradual rise in unit heat rates.

There are other factors involved beyond generating unit components degrading over time that affect unit heat rates, like the type and quality of fuel being consumed and at what load the units are being dispatched (higher loads usually result in lower heat rates). Also, work performed during unit outages can recover much of the heat rate (efficiency) that was lost due to plant component degradation. Ms. Wilson acknowledges that heat rates go up and down over time in Sierra Club's response to Item 3 of the Commission Staff's First Request for Information.

Also, in the attachment to Big Rivers' response to Item 5(f) of the Sierra Club's Second Request for Information, a table showing the forecast of yearly net heat rates by unit from 2012 through 2026 was provided. This table shows that the unit net heat rate forecasts are not exactly constant but are slightly changing from year to year. The net heat rates are declining immediately following maintenance outages (turbine inspections) and then gradually increasing over time until the next scheduled maintenance outage. Looking at the whole trend, the unit net heat rate forecasts are rather constant. Evaluating the last six years of the Big Rivers system (coal units) net heat rate (shown in table on the next page), it can be seen that the Big Rivers system net heat rate is constant or even slightly decreasing during this period.

Big Rivers System (Coal Units) Net Heat Rate (NTU/kWh)	
Year	**Net Heat Rate**
2006	11,135
2007	11,185
2008	11,117
2009	11,168
2010	11,041
2011	11,009

Moreover, it is again just baseless speculation that Big Rivers could do something a different way or that doing it differently would have any impact on the result.

Q. On page 26 of her testimony, Ms. Wilson argues that Big Rivers' analysis was flawed because it used a constant forced outage rate. Do you agree?

A. No. In the attachment to Big Rivers' response to Item 5 (a through d) of the Sierra Club's Second Request for Information, Big Rivers provided tables displaying the forecasted equivalent forced outage rate ("EFOR") and forecasted equivalent availability factor ("EAF") by unit by year for 2012 through 2026. The tables display a constant EFOR forecast for each unit and varying EAF forecast for each unit. The varying EAF forecast for each unit depends on the units' planned outage schedule. In Big Rivers' response to Item 5a of Sierra Club's Second Request for Information, where Big Rivers stated it expects constant unit availability for each of the

environmental retrofit units, that should be clarified to say that Big Rivers does not expect to alter the planned outage duration for each of the environmental retrofit units. Also, once the environmental retrofits are installed, Big Rivers expects no change in that unit's forced outage rate or availability.

Big Rivers installed an SCR at its Wilson unit in 2003, SCRs at both of the HMP&L Station Two units in 2004, and an FGD at its Coleman units in 2006 without any effect on the units' availability. A table displaying the past ten years' performance (EAF and EFOR) for the Big Rivers system (coal plants) follows.

Big Rivers System (Coal Units) Performance		
Year	**EAF, %**	**EFOR, %**
2002	87.4	7.2
2003	85.2	7.3
2004	88.3	4.7
2005	89.8	3.2
2006	89.9	5.2
2007	88.8	4.8
2008	87.9	4.7
2009	86.3	4.2
2010	93.7	3.6
2011	93.2	4.2

Moreover, this is another example of baseless speculation that Big Rivers could do something a different way or that doing it differently would have any impact on the result.

Q. On page 26 of her testimony, Ms. Wilson argues that Big Rivers' analysis was flawed because it allegedly modeled on a fleet-wide basis rather than each unit on a standalone basis. Do you agree?

A. No. On page 29 of her testimony, Ms. Wilson also states, "this is an acceptable modeling practice." Big Rivers modeled its CSAPR projects that reduce emissions of SO_2 and NO_X on a fleet-wide basis because CSAPR is a cap and trade program that allows utilities to buy, sell, or trade allowances within its variability limit to meet compliance. Big Rivers chose this option in order to provide the least cost compliance solution for its Members. However, for MATS compliance, Big Rivers was required to (and did) model each unit individually because the MATS emission limits are rate-based rather than quantity-based, and each unit must comply independently. Big Rivers is obligated to choose the environmental compliance plan that provides the least cost impact to its Members' rates at the lowest possible risk. Big Rivers has done that in the Build Case. Moreover, once again, Ms. Wilson engages in baseless speculation that Big Rivers could do something a different way or that doing it differently would have any impact on the result.

Q. On page 28 of his testimony, Mr. Kollen states that Big Rivers is relatively inexperienced with large-scale construction projects and that supports the Buy Case. Do you agree?

A. No. Big Rivers still employs the majority of the people that were responsible for managing the construction of its three existing SCRs, the Coleman Units over fire air projects, and the Green Units Coal Reburn projects for NO_X control ($159.35 million[2]), and the Coleman Scrubber ($98.5 million) for SO_2 control. These valued employees have significant experience in managing large-scale pollution control construction projects and completing them on time and on budget. Additionally, overall project management responsibility within Big Rivers will be assigned to Eric Robeson, Vice President of Environmental Services and Construction. Mr. Robeson was hired in 2011 specifically to lead Big Rivers' efforts in this area. The majority of his 30-plus years of utility experience is in project management. A summary of Mr. Robeson's education and experience is attached hereto as Exhibit Berry Rebuttal-2.

I would note that the Coleman Scrubber, which was placed in service in 2006, was completed on time and under budget. Mr. Kollen is engaging in baseless speculation about alleged impacts to Big Rivers' analysis.

Q. Mr. Kollen states that there is a potential for cost overruns in the Build Case that supports the Buy Case. Do you agree?

A. No. Although there may be potential for cost overruns on any large project, Big Rivers has the utmost confidence in the estimates provided by Sargent

[2] The NOx project costs shown include the entire cost of the HMP&L Units SCRs, not just Big Rivers' share.

& Lundy. As stated in Mr. DePriest's direct testimony in this proceeding, Sargent & Lundy "has completed similar compliance planning activities for more than 40 other electric utilities. S&L also has considerable experience with the federal and state environmental regulations affecting power plant operations, as well as the specification, evaluation, selection and implementation of emission control technologies for both gas- and coal-fired utility power facilities. For example, S&L has provided, or is providing, engineering services for the implementation of over 75 flue gas desulfurization ("FGD") retrofit projects, over 60 selective catalytic reduction ("SCR") projects, over 70 mercury control projects, and over 15 sorbent injection projects, all of which are technologies that are recommended as part of the Big Rivers 2012 environmental compliance plan." Big Rivers chose Sargent & Lundy to complete their study due to their impeccable credentials, experience, and expertise in these types of projects.

In addition, Big Rivers believes the current market conditions for wet FGD systems have created a buyer's market in that there are only 1 or 2 other projects in the same phase of the bid cycle as the Wilson project. Big Rivers expects numerous FGD suppliers to bid on this project, thus reducing the odds that final costs will exceed the Sargent & Lundy estimate. However, if Big Rivers waits and implements the Build Case later, as KIUC suggests Big Rivers can do, that may not be the case.

Q. Mr. Kollen argues that the magnitude of the capital costs of the 2012 Plan supports the Buy Case. Do you agree?

A. No. The magnitude of the capital costs for the 2012 Plan is not as critical to Big Rivers as the magnitude of the impact on its Members' rates. As shown in all of the comparison cases as calculated by Big Rivers, or as calculated by the Interveners in this proceeding, the Build Case has the least impact on Member rates in every scenario. In keeping with Big Rivers' mission "to safely deliver low-cost, reliable wholesale power and cost-effective shared services desired by the Members," Big Rivers is obligated to choose the environmental compliance plan that provides the least cost impact and at the lowest risk to its Members.

Q. On page 27 of her testimony, Ms. Wilson asserts that Big Rivers' analysis was flawed because it used both real and nominal dollars in its net present value revenue requirement calculations in its financial model. Do you agree with Ms. Wilson?

A. No. Big Rivers did use nominal dollars in its analysis. Ms. Wilson alleges that Sargent & Lundy's capital estimates were in real dollars. However, the Sargent & Lundy prices are based on 2011 dollars and include $9.7 million of escalation and $13.6 million for contingencies. Big Rivers does not anticipate that any contracts or purchase orders will contain escalation clauses. In other words, Big Rivers will buy the equipment in late 2012 or

early 2013 for the FGD and mid 2013 for the remainder of the projects. The vendors will then bear the risk of price escalation.

Q. On page 14 of his testimony, Mr. Kollen criticizes Big Rivers' net present value calculations as being "meaningful only for the purposes of ranking the various scenarios and quantifying the differences between them." Do you agree?

A. Yes. The purpose of Big Rivers' analysis was to rank Big Rivers' compliance options.

Q. On page 23 of her testimony, Ms. Wilson criticizes Big Rivers for using an energy market price forecast from Pace Global, LLC ("Pace"), which included an assumption that there would be a price impact as a result of future regulation of CO_2, but did not include that assumption in fixed production costs. Do you agree with that criticism?

A. No. Both Big Rivers and Pace had to create forecasts. For Big Rivers, that involved developing forecasts using most likely outcomes and values that are reasonably known and measurable. For Big Rivers, the outcome was the timing, requirements, and compliance costs of potential CO_2 regulation were not sufficiently likely or known and measurable to impact its forecast of fixed production costs. As explained in the rebuttal testimony of Patrick Augustine, Pace used stochastic modeling to develop a range of possibilities and an expected value for the impact of potential CO_2 regulation on power

market prices. Pace did not assume that CO_2 regulation was a given, but rather modeled numerous (200) possibilities. Moreover, Big Rivers ran sensitivities using the ACES Power Marketing ("APM") forecast that did not include CO_2, and the Build Case was still the least cost option.

Q. On page 13 of her testimony, Ms. Wilson indicates that additional stack testing may reveal the need for Big Rivers to upgrade its existing electro static precipitators ("ESPs") and do polishing baghouse (and full baghouse technologies, if necessary) retrofits. What steps has Big Rivers taken regarding precipitator testing and modeling?

A. Big Rivers has been in discussions since receiving the Sargent & Lundy study with a variety of firms relative to MATS compliance. These range from reagent suppliers, equipment suppliers, precipitator manufacturers, and engineering firms.

Big Rivers is in the process of finalizing an agreement with a carbon supplier to run a series of tests at one of its units. We expect to conclude these negotiations this month and begin testing in October. This test is planned to run approximately 6 months and utilize a variety of proprietary carbon formulas to determine which performs best given Big Rivers' coal supply, mercury reduction requirements, and precipitator performance.

Big Rivers has had discussions with Sargent & Lundy and Burns & McDonnell regarding precipitator modeling services. We expect this to

incorporate some of the test data we receive as part of the carbon testing protocol. I would also note that Sargent & Lundy advised us that Big Rivers' existing equipment was suitable for maintaining the filterable particulate matter below 0.03 lbs/mmBtu while using activated carbon injection for mercury control as required by the MATS rule. Sargent & Lundy only recommended testing for confirmation, and Big Rivers is undertaking that prudent step.

Also, Big Rivers recently held a precipitator workshop with Neundorfer on August 9. Managers and electrical specialists from all of Big Rivers' plants discussed the current status and issues for each precipitator in order to better understand how these units will react to potential carbon and sorbent injection systems. Neundorfer is preparing a proposal for future evaluation and recommendations regarding these units.

Q. In his testimony, Philip Hayet discusses a discovery dispute between Big Rivers and KIUC over the APM database. Do you believe that the discovery dispute caused any prejudice to the intervenors?

A. No. The intervenors have tried to make an issue out of the discovery dispute between Big Rivers and KIUC relating to the APM database through false or misleading statements essentially alleging that Big Rivers has been obstructionist. However, Big Rivers has instead made a concerted effort throughout this proceeding to provide information the intervenors

have sought on an expedited basis, and the intervenors have suffered no prejudice as a result of the discovery dispute.

First, the intervenors had no entitlement to the APM database for the reasons stated in Big Rivers' June 8 response to the intervenors' joint motion to compel. Second, and also as explained in the June 8 response to the joint motion to compel, even if the intervenors were entitled to the database, they did not request the database in their data requests.

Third, even if they were entitled to the database and had they requested the database in formal discovery, the intervenors were not prejudiced because APM provided the database in a timely manner and because the Public Service Commission ("Commission") gave the intervenors sufficient time to use the database. Big Rivers filed its application in this matter on April 2, 2012. Rather than waiting for the proper time for conducting discovery or simply asking Big Rivers for additional information, KIUC and the Attorney General filed motions to dismiss, on April 23 and April 25, respectively. Big Rivers objected to the requested dismissal, but in an effort to accommodate the intervenors, Big Rivers began compiling and providing information that the intervenors indicated they needed in their motions to dismiss. Even before the intervenors issued their data requests on May 21 and even though Big Rivers' discovery responses were not due until June 1, Big Rivers provided a CD (on April 26) containing input and output data from financial models

used in its cost effectiveness evaluation and Pace price curve data for energy prices, fuel prices, and allowance prices. As noted below, additional CDs containing model-related information were filed May 24, 29, and 30, and June 4.

Additionally, on May 11, counsel for Big Rivers received a letter from KIUC's counsel, which contained the first actual request from the intervenors for additional material, and which requested information about how to acquire the models that Big Rivers and its consultants used, information about what licenses they would need, input data, input and output files, user's manuals, and installation requirements for the models. Big Rivers immediately began putting together that information and responded on May 18 with information about the models that were used and who the intervenors would need to contact to acquire the models. Big Rivers also filed additional input and output data and files in response to the May 11 letter on May 24, May 29, May 30, and June 4. On May 24, 2012, Big Rivers filed a CD containing input and output data and input assumptions from the approximately 20 runs of the planning model that APM performed for this case. On May 29, 2012, Big Rivers filed one CD containing input and output data from additional financial model runs and another CD containing input and output data from the Pace model. On May 30, 2012, Big Rivers filed a CD containing input and output data from the Sargent & Lundy model. And on June 1, Big Rivers sent out a CD

containing forward market power price shape and load shape data from APM, which CD was filed on June 4. Thus, Big Rivers was clearly not being obstructionist throughout this proceeding.

On May 21, the intervenors issued their data requests, and Mr. Hayet sent an email to Big Rivers' counsel seeking contact information for someone at APM to assist him with the Ventyx Planning and Risk ("PAR") model. On May 24, counsel for KIUC sent an email to counsel for Big Rivers requesting the same or asking that Mr. Hayet be allowed to run the model at APM. KIUC's counsel proposed June 11-13 for Mr. Hayet to visit APM. As explained in Mr. Azman's rebuttal testimony, APM could not accommodate that request. On May 25, KIUC's counsel indicated that they would pursue obtaining the Ventyx Planning and Risk model. On May 29, KIUC's counsel sent an email reiterating that KIUC was going to obtain the PAR license, stating that they wanted a call to discuss what APM was going to provide, and stating that KIUC was targeting the week of June 11 to install the PAR software (less than a month before its testimony was originally due).

A call was held on June 4 among Big Rivers, APM, and the intervenors to discuss what APM was going to provide. On the call, it became clear that KIUC wanted APM's database and that APM was not able to provide it, for the reasons explained in Mr. Azman's rebuttal testimony.

On June 6, the intervenors filed a joint motion to compel seeking the APM database. On June 8 (just 4 days after the call in which KIUC said it needed the database), Big Rivers emailed out its response to the joint motion indicating that APM had worked out its issues with providing the database, and that the database could be provided subject to certain conditions, including that the confidential and proprietary information of other APM clients had to be removed from the database that would be provided, that Ventyx needed to be the one to strip out the non-Big Rivers information, that the intervenors should pay for Ventyx to strip out the non-Big Rivers information, that Mr. Hayet would need a license to use the PAR modeling software, and that Mr. Hayet would need to sign a nondisclosure agreement with APM.

On June 11, the intervenors provided their joint motion to stay the procedural schedule based on not having the database and certain alleged errors with the model-related files Big Rivers had filed on CDs in May and June, although KIUC had not previously mentioned any file issues that Big Rivers had not already attempted to resolve. Subsequently, KIUC's counsel sent Big Rivers' counsel an email with a list of alleged errors with the model-related files, although Big Rivers had already corrected some of those issues and there was nothing wrong with some of the files claimed to be corrupt.

A telephonic informal conference was held June 12, at which time Big Rivers agreed to pay for Ventyx to strip down the database. Big Rivers reiterated the other conditions of Mr. Hayet obtaining the database, namely that Mr. Hayet would have to obtain a PAR license and sign a nondisclosure agreement with APM.

Mr. Hayet did not obtain the PAR license until June 18, and evidence of this was not provided to Big Rivers' counsel until June 22. Mr. Hayet also did not sign the nondisclosure agreement with APM until June 22. Upon receipt of those two items, the stripped-down APM database was provided to Mr. Hayet (on June 22). Mr. Hayet and APM discussed technical details of the APM database on June 25. From June 25 until after the KIUC filed its motion for an extension of time on or about July 11 (which alleged for the first time that Mr. Hayet was having problems with the model), Mr. Hayet did not contact APM with any questions or concerns about running the PAR model, although APM personnel was made available to Mr. Hayet to assist with model-related questions well before he obtained the PAR license. I would note that this is the first time Mr. Hayet has tried to run the PAR model.

With regard to the alleged file issues, KIUC's counsel had sent an email to Big Rivers' counsel on June 5 indicating that one of the files Big Rivers had provided was corrupted. Big Rivers corrected this and other file issues on June 8. On June 11, after sending the motion to stay the

procedural schedule, KIUC sent a list of file issues, although as noted above, Big Rivers had already corrected some of those issues and there was nothing wrong with some of the files claimed to be corrupt. On June 14 and 21, Big Rivers re-filed all of the model-related files it had provided on CDs previously on USB drives, correcting all issues.

Thus, on May 24 and May 29 (prior to Big Rivers' data request responses being due), KIUC and Mr. Hayet indicated that the week of June 11 is when they proposed to either use the PAR model at APM or install the PAR model on their computers (even though their second and originally final round of data requests was originally due June 13). Big Rivers and APM agreed to provide the database on June 8 (prior to when Mr. Hayet wanted to install the software that could use the database), but it took until June 22 for KIUC to provide evidence that Mr. Hayet had a PAR license and a signed nondisclosure agreement with APM (both of which conditions were included in Big Rivers' June 8 response to the motion to compel). Additionally, Big Rivers promptly responded to any errors alleged by the intervenors with regard to allegedly corrupt files.

By June 22, Mr. Hayet had the APM database and the USB drives corrected all previous file issues. This was approximately 1 month before the intervenors were required to file their testimony (on July 23). Big Rivers filed its responses to the first set of data requests on June 1, which was just over 1 month before the intervenors' testimony was originally

supposed to be due (on July 13). Thus, even if the intervenors were entitled to the database, there was no prejudice to the intervenors as a result of the discovery dispute.

I would also note that on June 1, when Big Rivers filed its first set of data request responses and Big Rivers sent them to the intervenors, Big Rivers offered to arrange for the responses to be delivered on June 2 (a Saturday), if someone would be available to accept delivery. None of the intervenors took Big Rivers up on the offer. Additionally, the intervenors did not provide their models, input assumptions, etc. in their testimony, and Big Rivers had to request the same through discovery. And only KIUC used the PAR model, so the Sierra Club and the Attorney General could not have been prejudiced.

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. The discovery dispute has no relevance to whether the Build Case is the least cost option and should have no impact on the Commission's decision in this matter. Also, the intervenors have consistently failed to demonstrate that the Build Case is not the least cost option. The intervenors' testimonies rely only on faulty or immaterial allegations of error or speculation and innuendo, and should be rejected. Sierra Club's NGCC proposal is based on tenuous assumptions, is simply not feasible, is not the least cost option, and should also be rejected. Big Rivers has shown that

the Build Case, which is Big Rivers' proposed 2012 Environmental Compliance Plan, is the least cost option with the lowest risk to its Members. As such, the Commission should grant Big Rivers the relief it has requested in this proceeding.

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

A. Yes.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Allegations of Error

#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
1	The Build and Buy cases are approximately equivalent on a net present value basis.	Mr. Kollen Page 6	Mr. Siewert
2	The Buy Case provides maximum flexibility and minimum risk.	Mr. Kollen Page 8, 26	Mr. Berry
3	The Buy Case is preferable to the Build Case since the NPVRR is approximately equivalent.	Mr. Kollen Page 8	Mr. Siewert
4	The potential for cost overruns supports the Buy Case.	Mr. Kollen Page 8, 27	Mr. Berry
5	Big Rivers' uncertain ability to finance the 2012 Plan supports the Buy Case	Mr. Kollen Page 8, 29	Mr. Siewert
6	Big Rivers' relative inexperience with capital construction projects supports the Buy Case.	Mr. Kollen Page 8	Mr. Berry
7	The magnitude of the capital costs of the 2012 Plan supports the Buy Case.	Mr. Kollen Page 8	Mr. Berry
8	The uncertainty surrounding CSAPR requirements supports the Buy Case.	Mr. Kollen Page 8	Mr. Shaw
9	The rate impact on members if there are smelter load losses supports the Buy Case.	Mr. Kollen Page 8	Mr. Wolfram
10	The Buy Case affords Big Rivers the flexibility to subsequently pursue the Build Case in the future.	Mr. Kollen Page 9	Mr. Berry
11	The discounting is performed on an annual basis using the Company's weighted cost of debt grossed-up for the contract TIER of 1.24 to an overall discount rate of 7.93%.	Mr. Kollen Page 14	Mr. Siewert
12	NPV analyses fail to reflect the effects on member revenue requirements on an "all-in" basis and instead focus only on the net present value to the Company of the "to-go" expenses and revenues of the alternatives	Mr. Kollen Page 14	Mr. Siewert
13	The NPV analysis is meaningful only for the purposes of ranking the various scenarios and quantifying the differences between them.	Mr. Kollen Page 14	Mr. Berry
14	The Company's NPV analysis fails to include the TIER on the interest expense, which understates the net present value of the debt service expense included in the various alternatives.	Mr. Kollen Page 15	Mr. Siewert
15	The Company's NPV analyses assume that the debt service is levelized over 30 years, which is inconsistent with the ratemaking process.	Mr. Kollen Page 15	Mr. Siewert
16	The Company failed to include the economic effects of the costs to remove the existing scrubber at Wilson.	Mr. Kollen Page 16	Mr. Berry

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
17	The Company's NPV analyses fail to reflect any reduction in non-fuel production operation and maintenance expense, other than changes in variable environmental O&M expense, in the Partial Build or Buy cases or the Buy case Smelter load loss sensitivity.	Mr. Kollen Page 17	Mr. Berry
18	The computations both ignore the fact that if the smelter load is lost, there will be no more smelter revenues. More specifically, the Company's NPV analyses incorrectly assume that the Smelter revenues will continue (or be recovered in their entirety from the remaining rural and large industrial customers through huge rate increases) while the Company also sells the power into the market that will no longer be supplied to the Smelters.	Mr. Kollen Page 20	Mr. Siewert
19	The Company assumed there would be no reductions in the rural or large industrial sales due to the drastic rate increases.	Mr. Kollen Page 23	Mr. Wolfram
20	The Commission should do everything possible to retain the smelter load.	Mr. Kollen Page 24	Mr. Wolfram
21	If the Commission authorizes Big Rivers to proceed with ECP projects 4 and 5, then it will commit the Company, its creditors, and all of its customers to the completion of the projects, the financing of the projects, and the obligation to pay through rates for the projects.	Mr. Kollen Page 29	Mr. Wolfram
22	The Buy Case is superior and less risky given the possibility of additional undiscovered errors in Big Rivers' analysis.	Mr. Hayet Page 5	Mr. Wolfram
23	The Company has overstated the cost of the Buy case.	Mr. Hayet Page 18	Mr. Azman

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
24	What the Company does that is unreasonable is to begin implementing changes and incurring costs in the Buy Case in early 2012. For example, in the Buy Case, the Company shuts down the DB Wilson unit in March 2012 for three months for the first time. However, in the Build Case, the DB Wilson unit does not have a change to its emissions removal rate until several years later. This results in overstating the costs of operating the System in the Buy Case for several years. I changed this input in the Buy Case to begin shutting down the DB Wilson unit in 2016 to be consistent with the Build Case.	Mr. Hayet Page 19	Mr. Azman
25	Buy Case. DB Wilson VO&M is higher in the Buy Case than the Build Case. By 2026, it is as much as 13.6% higher than the Build Case. I set the values in the Buy Case equal to the Build Case. This still understates the costs in the Build Case to some extent. (See Incremental VO&M costs on Page 2 of 2 in Exhibit Berry-2)	Mr. Hayet Page 19	Mr. Azman
26	Build Case. DB Wilson Emissions Removal Rate. DB Wilson's upgrade will not be completed until 2016. APM had the emissions reduction rate change beginning January 2015. I reset this to begin January 2016.	Mr. Hayet Page 19	Mr. Azman
27	Build No Smelter Case. The Company input VO&M at Green 1 at a significantly higher amount in the Build No Smelter Case than in the Buy No Smelter Case. I corrected this.	Mr. Hayet Page 19	Mr. Azman
28	Build Case. VO&M at Green 2 is the same in the Build and Buy cases, although it should be different once the Green 2 SCR is added in 2015. Incremental O&M is indicated to be $1.58 million beginning in 2015 due to the addition of the SCR per Exhibit Berry-2 page 2 of 2. I added this change to the Build Case.	Mr. Hayet Page 19	Mr. Azman
29	HMPL 1&2 has the same VO&M in the Build and Buy Cases. Exhibit Berry-2 indicates that the Build Case should be higher by approximately $800,000 per year. I did not have time to make this correction, but had it been made it would have increased the cost of the Build Case.	Mr. Hayet Page 20	Mr. Azman

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
30	HMPL 1&2. The Buy No Smelter Case has higher VO&M than all of the other cases, which does not make sense. I changed this to be consistent with the other cases.	Mr. Hayet Page 20	Mr. Azman
31	Build Case. The Build Case has the environmental upgrade project completed January 1, 2014. According to Exhibit Berry-2 page 1 of 2, it should be 2015. I made this correction to the Build Cases.	Mr. Hayet Page 20	Mr. Azman
32	HMPL 1&2 VO&M costs. The Costs that the Company used in its financial analysis do not match what the Company indicates should have been used in the production cost model. The Company should explain this.	Mr. Hayet Page 20	Mr. Siewert
33	Coleman 1, 2 & 3. Even though compliance with CSAPR won't begin until 2016, Big Rivers has begun to constrain the dispatch of the Coleman units as early as 2013. I changed this to begin in 2016.	Mr. Hayet Page 20	Mr. Azman
34	Coleman 1, 2 & 3. Given that the units will now be shut down for multi-month periods of time to limit emissions, it may not be necessary to schedule maintenance during a different period of time. I changed the maintenance to occur at the same time that the unit is taken offline.	Mr. Hayet Page 20	Mr. Azman
35	For purposes of my runs, I selected to use a specific Monte Carlo feature known as the Convergent Monte Carlo method. Because I selected this option, I noticed inconsistencies in the results including Coleman 2 having hundreds of startups per year. It turned out that the database had two inputs reversed. The mean time to repair input was switched and input as the average time to repair at the Coleman 2 unit. I corrected this error and the results appeared to be reasonable.	Mr. Hayet Page 20	Mr. Azman

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
36	PACE market price forecast is too high to use as a reference case. A comparison of the market price forecasts provided by IHS and APM to the PACE Global forecast indicates that the PACE Global forecast (which assumes significant CO2 compliance costs during the study period) is an outlier and should not be relied as a reference case forecast. I have used the APM forecast, which is essentially the same as the IHS forecast, as the basis for my market price forecast.	Mr. Hayet Page 20	Mr. Augustine
37	To run a production cost model in the Build Case without imposing CO2 costs constraints, but including in that model a market price forecast that does include CO2 costs is completely inconsistent and biased in favor of the Build Case. Either consideration of CO2 costs should be removed from the process of developing the market price forecast, or CO2 costs should be included in the production cost modeling step along with the market price forecast that included consideration of CO2 costs.	Mr. Hayet Page 20	Mr. Berry
38	Losing the smelter load and investing nearly $300 million in its generating units effectively means that Big Rivers would become a merchant generator that would have only coal-fired energy available for sale, which is riskier.	Mr. Hayet Page 24	Mr. Azman Mr. Wolfram
39	The Commission should modify Big River's proposed ECR rate recovery mechanism such that revenue requirements are allocated first to off-system and the combined retail rat classes on a total adjusted revenue basis, then among the three Big Rivers retail rate classes on a net revenue basis.	Mr. Baron Page 5	Mr. Wolfram
40	The net revenue method should revert to the total adjusted revenue method after the MRSM and RER funds are depleted.	Mr. Baron Page 8	Mr. Wolfram
41	Additional stack testing may reveal the need for Big Rivers to upgrade its ESPs and do polishing baghouse retrofits.	Ms. Wilson Page 13	Mr. DePriest Mr. Berry
42	The load forecast is overstated because it fails to account for various DSM efforts.	Ms. Wilson Page 20	Mr. Azman, Mr. Berry

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
43	The input natural gas price forecast from the PACE Global modeling is incorrect because it appears to be higher than other natural gas prices developed in 2011 and 2012.	Ms. Wilson Page 21	Mr. Augustine
44	The use of a CO2 emissions price to determine the energy market prices in the PACE Global modeling, but leaving it out of the APM production cost modeling and the dispatch of generating units, is inappropriate.	Ms. Wilson Page 23	Mr. Berry
45	The resulting output energy prices from the PACE Global modeling/Use of inflated market prices are incorrect.	Ms. Wilson Page 24	Mr. Augustine
46	The assumption that capacity, heat rates, forced outages, and availability factors stay constant over time is incorrect.	Ms. Wilson Page 25	Mr. Azman Mr. Berry
47	The use of both real and nominal dollars in calculations of NPVRR in the Big Rivers financial modeling is incorrect.	Ms. Wilson Page 27	Mr. Berry
48	Big Rivers does not model the full set of controls that will be required under the EPA rules.	Ms. Wilson Page 28	Mr. Shaw Mr. Berry
49	Big Rivers does not model its units individually, but rather as a block, choosing to retrofit all of the units together rather than examining the economics of each unit on a standalone basis.	Ms. Wilson Page 26, 29	Mr. Azman Mr. Berry
50	Big Rivers models a selection of future costs associated with retrofits rather than the actual forward going running costs of the units, which is an error.	Ms. Wilson Page 30	Mr. Siewert
51	Big Rivers does not model the emission control retrofits against a reasonable set of alternative options, including but not limited to: a natural-gas fired combustion turbine or combined cycle replacement, a replacement with market purchases, or a replacement with some combination of energy efficiency, renewable resources, natural gas units, and market purchases.	Ms. Wilson Page 30	Mr. Berry Mr. Siewert
52	It would be less expensive for Big Rivers to retire all of its coal units and to replace them with new NGCC units	Ms. Wilson Page 37	Mr. Siewert Mr. Berry Mr. Augustine
53	Big Rivers embraced a piecemeal approach to pending and emerging regulations	Dr. Steinhurst Page 6	Mr. Shaw

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#	Alleged Error	Intervenor Reference	Big Rivers Rebuttal Witness
54	Big Rivers created a bias in favor of additional future environmental retrofits	Dr. Steinhurst Page 7	Mr. Wolfram
55	Among the material errors Big Rivers made [was] exclusion of ongoing operations and maintenance (O&M) costs at each of the coal units.	Dr. Steinhurst Page 9	Mr. Siewert
56	The Big Rivers natural gas forecast is out of date and is too high.	Dr. Steinhurst Page 9	Mr. Augustine
57	Big Rivers failed to present sensitivity cases.	Dr. Steinhurst Page 9	Mr. Wolfram Mr. Augustine
58	Big Rivers did not compare the retrofits against relevant and alternative options	Dr. Steinhurst Page 10	Mr. Siewert Mr. Berry Mr. Wolfram

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Experience

Vice President Environmental Services and Construction

2011 to Present — Big Rivers Electric Corporation, Henderson, Ky

Responsible for developing and implementing overall compliance plan for CSAPR and MATS programs. Projects include $285M in capital expenditures at 9 units over 4 year time frame. Serve on Internal Risk Management Committee. Manage 17 environmental professional personnel. Oversee Supply Chain activities including additional 17 personnel.

Director of Generation Planning

2005 to 2011 — Vectren Corporation, Evansville, In

Responsible for developing long term plan to meet generation requirements. Developed cost estimates for financial models, screen technological options, monitored environmental regulations and coordinated outside firms. Presented results to members of senior management including Board of Directors

Director of Coal Mining and Utility Infrastructure Services

2001 to 2005 — Vectren Corporation, Evansville, In

Liaison between corporate office and 3 subsidiary companies. Responsible for developing and reviewing budgets and variance reporting. Member of two Boards of Directors and one Audit Committee. Manage construction of new corporate headquarters building.

Plant Manager

1995 to 2000 — Southern Indiana Gas and Electric Company, Evansville, In

Overall responsibility for managing all aspects of three unit coal fired power plant: production, maintenance, capital improvements, safety, labor relations and environmental compliance. Develop and accountable for $40 million annual operating budget. Direct efforts of 100 employees. Developed long range plans and goals for plant.

Project Manager

1991 to 1994 — Southern Indiana Gas and Electric Company, Evansville, In

Responsible for corporate compliance with Clean Air Act Amendments. Directed efforts of outside engineering and construction firms performing Clean Air Act compliance study, flue gas desulfurization vendor selection, construction management, and site construction with 400 employee work force. Led team in $100 million plant addition in less than two years construction. Project complete four months ahead of schedule and $7 million under budget. Participated in contract negotiations and regulatory approval process. Only company employee on project till startup.

Project Engineer

1980 to 1990 — Southern Indiana Gas and Electric Company, Evansville, In

Responsible for conceptual studies, design review, construction management, and directing efforts of outside engineering and construction firms. Developed internal reporting mechanisms including video and photographic reports for senior management. Duties included project definition, scheduling, material specifications and procurement, and project review. Projects included office complex, computerized inventory system, two warehouses, water treatment plant, and semi-annual outages at coal fired plant.

Construction Engineer

1977 to 1980 — Fluor Engineers and Constructors, Houston, TX

Cost scheduling engineer for Saudi Arabian gas program during two year field assignment overseas.

Registration

Professional Engineer, State of Indiana since 1982

Education

BS Mechanical Engineering 1977	Rose Hulman Institute of Technology Terre Haute, Indiana
MBA 1988	Ball State University Muncie, Indiana

Relevant Project Management experience includes:

Vectren Corporate Headquarters	2005	$28M
Culley FGD System	1993	$100M
Culley Low NOx Burner	1992	$5M
Culley CEMS Installation	1992	$3M
Vectren Wagner Operations Center	1988	$12M
Vectren Central Warehouse	1986	$5M
Warrick Demineralizer	1988	$5M
Brown FGD Upgrade	1982	$5M
Annual Outage Scheduling and Coordination	1982-1995	$1-3M
Saudi Arabian Gas Program	1977-1980	$1B

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

OF

THOMAS L. SHAW
DIRECTOR, ENVIRONMENTAL SERVICES

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
THOMAS L. SHAW

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

A. My name is Thomas L. Shaw. I am employed by Big Rivers Electric Corporation ("Big Rivers"), 201 Third Street, Henderson, Kentucky 42420, as the Director, Environmental Services.

Q. Did you submit direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club.

Q. On page 28 of her testimony, Rachel Wilson asserts that Big Rivers' analysis was flawed because Big Rivers does not model the full set of controls that will be required under the EPA rules. Do you agree with Ms. Wilson?

A. No. It is pure speculation for Ms. Wilson to include in her analysis costs for complying with possible future regulations. The regulations Ms. Wilson mentions (NAAQS, CCR, 316b, and effluent limitations) are not final. History has shown (with CAIR/CSAPR, for example) that potential or proposed regulations at the stage of NAAQS, CCR, 316b, effluent

limitations, and CO_2 will have far different requirements (with far different compliance costs) than end up in any final regulations. Although it is appropriate for Big Rivers to take into consideration the risk of future regulation, the scope, timing, and cost requirements for Big Rivers to comply with those potential regulations are simply too uncertain at this time to use as a basis for making a compliance decision.

For example, we do not know at this time if any additional costs will be imposed on Big Rivers as a result of NAAQS. In the years following full implementation of MATS and Phase II of CSAPR, the EPA as stated in a May 1, 20012 press release fully expects the air quality in the areas impacted by these rules to improve enough to meet the 2008 ozone NAAQS standard. Additionally, the EPA in a June 15, 2012 press release addressing PM2.5 stated that "Thanks to recent Clean Air Act rules that have and will dramatically cut pollution, 99 percent of U.S. counties are projected to meet the proposed standards without undertaking any further actions to reduce emissions." If CSAPR and MATS do have the expected effect, no additional control equipment will be necessary for Big Rivers as a result of NAAQS.

While the regulations Ms. Wilson mentions are too speculative, the MATS regulation is final, and CSAPR is likely in its final form. Big Rivers had to make a compliance decision with the regulations that are reasonably

certain to require compliance (CSAPR and MATS), and Big Rivers chose the least cost option to do so (the Build Case).

Q. Are there any other flaws in Ms. Wilson's claim about possible regulations that you wish to address?

A. Yes. Ms. Wilson takes the approach that Big Rivers should consider certain possible regulations, but she ignores the consequences of possible regulations limiting or prohibiting hydraulic fracturing/fracking. Moreover, she does this even though the Sierra Club clearly wants to *at least* limit fracking. On its website, the Sierra Club says, "'Fracking,' a violent process that dislodges gas deposits from shale rock formations is known to contaminate drinking water, pollute the air, and cause earthquakes. If drillers can't extract natural gas without destroying landscapes and endangering the health of families, *then we should not drill for natural gas*" (emphasis added). (See the excerpts from Sierra Club's website attached hereto as Exhibit Shaw Rebuttal-1 and Exhibit Shaw Rebuttal-2.) If Sierra Club got its way and we did not drill for natural gas or even if we just placed limits on fracking suggested by Sierra Club, the price of natural gas and therefore the price of power would rise dramatically. Yet, Sierra Club suggests that building natural gas plants is a viable option for Big Rivers.

This also shows another flaw in Ms. Wilson's suggestion that Big Rivers include costs of complying with possible CCR, 316b, CO_2, etc. regulations. If Ms. Wilson is going to include in her analysis possible future

regulations that she says increase the cost of coal-fired generation, she should also include future regulations that will increase the cost of natural gas generation, like fracking, and that would make Big Rivers' Build Case look even better compared to her proposal to replace Big Rivers' existing coal-fired units with natural gas combined cycle units.

Additionally, in her modeling, Ms. Wilson assumes the capital cost for Big Rivers to comply with possible future effluent limitations would total approximately $1.3 billion (in 2011$). See the Excel spreadsheet attached to Sierra Club's response to Item 1 of KIUC's First Request for Information, tab "Env Capital & O&M." As discussed above, potential regulations relating to effluent limitations are too speculative at this time to come up with a reasonable estimate for compliance costs. We just do not know whether such regulations will be finalized, what the regulations will require, and what the timing and compliance cost of any such regulations will be. Nevertheless, even under a worst-case scenario (based on currently anticipated EPA proposals) with very low limits, I would not expect Big Rivers' capital costs for complying with any such regulations to exceed approximately $150 million based on information the EPA supplied to Indian Tribes in Enclosure III Supplemental Information Package for Tribal Consultations.

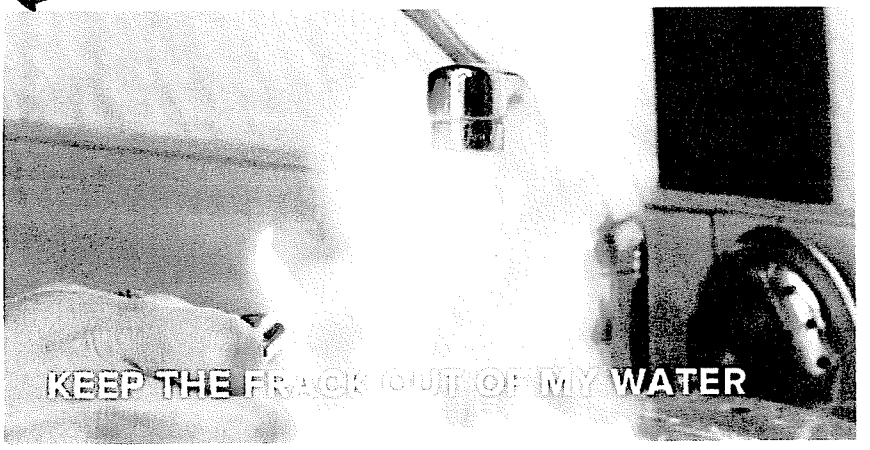
Q. On page 8 of his testimony, Lane Kollen asserts that the uncertainty surrounding CSAPR requirements supports the Buy Case. Do you agree with Mr. Kollen?

A. No. As explained in Big Rivers' response to Item 22 of the Commission Staff's First Request for Information, although CSAPR was stayed by the United States Court of Appeals for the District of Columbia Circuit on December 30, 2011, the stay is not directed to the substance of the rule. EPA will likely overcome challenges to the rule and leave the rule as-is. CSAPR is in a far different stage of certainty than NAAQS, CCR, 316b, and effluent limitations regulations.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Explore, enjoy and protect the planet



A still from the documentary Gasland

YOU CAN HELP

Please enter your email and zip code to take action, or to sign up for our email newsletter.

Email

Zip

DIRTY, DANGEROUS, AND RUN AMOK

Natural gas drillers exploit government loopholes, ignore decades-old environmental protections, and disregard the health of entire communities "Fracking," a violent process that dislodges gas deposits from shale rock formations is known to contaminate drinking water, pollute the air, and cause earthquakes If drillers can't extract natural gas without destroying landscapes and endangering the health of families, then we should not drill for natural gas

"Fossil fuels have no part in America's energy future – coal, oil, and natural gas are literally poisoning us The emergence of natural gas as a significant part of our energy mix is particularly frightening because it dangerously postpones investment in clean energy at a time when we should be doubling down on wind, solar and energy efficiency."
—Robin Mann, Sierra Club President

Support our battle to protect the environment with funding that's convenient for you

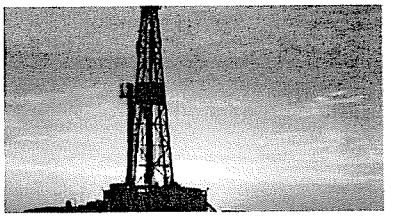
○ $25 ◎ $50 ○ $100 ○ $250

Get the Sierra Club *Insider*, our email newsletter. News, green lifestyle tips, and ways to take action: right to your inbox, twice a month

WHAT WE DO

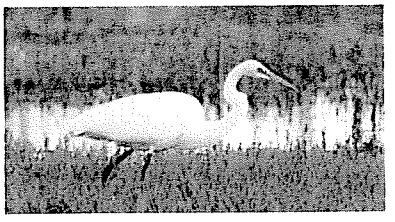
CLOSE INDUSTRY LOOPHOLES

The natural gas industry exploits loopholes and disregards common sense environmental and health standards



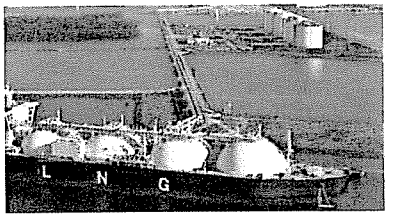
CLEAN UP DRILLING

Natural gas fracking poisons our water and air, tears up landscapes, and threatens the health of entire communities



PROTECT OUR PARKS

Imagine hiking your favorite park, or fishing your favorite stream – only to have your peace destroyed by polluted water, or an earsplittingly loud drilling operation



STOP LNG EXPORTS

Exporting Liquefied Natural Gas (LNG) to overseas markets is a dirty, dangerous practice that lets the industry make a killing at the expense of human health

GET THE FRACKING FACT SHEET

OUR BLOG

Saturday, July 28th, more than 5,000 people rallied on the West Lawn of the Capitol in Washington, DC, and then marched through the streets of DC as part of the Stop the Frack Attack Rally. This

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Exhibit Shaw Rebuttal-1
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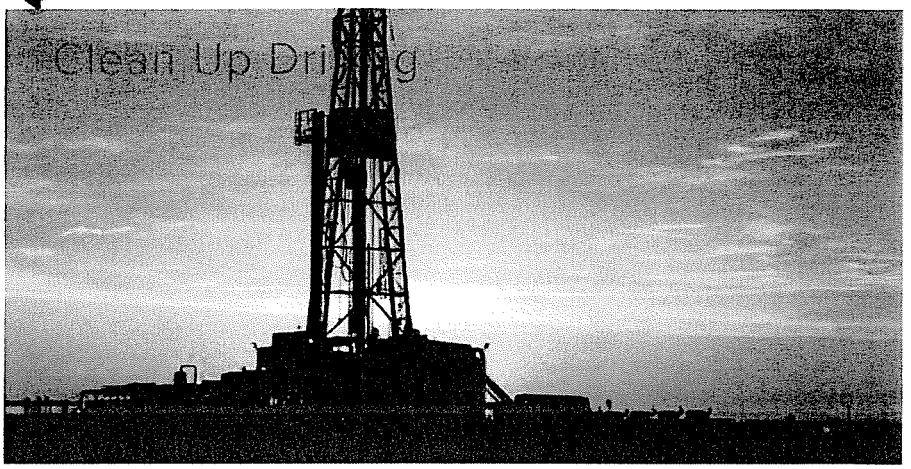
was the first-ever national rally on fracking.
'Fracking,' a violent process that
dislodges...
Thousands Gather for Stop the Frack
Attack Rally



NATURAL GAS FRACKING POISONS OUR WATER AND AIR, TEARS UP LANDSCAPES, AND THREATENS THE HEALTH OF ENTIRE COMMUNITIES.

Poor industry oversight leads to the following problems:

Sloppy fracking practices contaminate families' drinking water.
Fracking fluid is so toxic that your local water treatment plant is unable to make it safe.
Fracking sites dump pollution into the air of nearby communities.
The industry's exemptions to landmark health and environmental protections let them damage entire landscapes and habitats.
Weak safeguards do nothing protect communities from accidents and leaks.
The natural gas industry continues to resist cooperating with federal, state, and local officials to adopt environmental safeguards. See the Frack Watch and speak out for stronger protections.

YOU CAN HELP

Please enter your email and zip code to take action, or to sign up for our email newsletter.

Email

Zip

Support our battle to protect the environment with funding that's convenient for you.

○ ◎ ○ ○
$25 $50 $100 $250

Get the Sierra Club *Insider*, our email newsletter. News, green lifestyle tips, and ways to take action: right to your inbox, twice a month.

GET THE FRACKING FACT SHEET

Our Blog

On Saturday, July 28th, more than 5,000 people rallied on the West Lawn of the Capitol in Washington, DC, and then marched through the streets of DC as part of the Stop the Frack Attack Rally. This was the first-ever national rally on fracking. "Fracking," a violent process that dislodges...

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Thousands Gather for Stop the Frack Attack Rally

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

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REBUTTAL TESTIMONY

OF

TRAVIS A. SIEWERT
SENIOR STAFF ACCOUNTANT

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
TRAVIS A. SIEWERT

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

A. My name is Travis A. Siewert. I am employed by Big Rivers Electric Corporation ("Big Rivers"), 201 Third Street, Henderson, Kentucky 42420, as a Senior Staff Accountant.

Q. Did you submit direct testimony in this proceeding?

A. No. However, I have been involved with this proceeding, and I have adopted certain portions of Mark Hite's direct testimony as my own and certain of the responses to requests for information that Mr. Hite sponsored.

Q. Please describe your involvement in this proceeding.

A. I was directly involved in the financial modeling of the compliance options Big Rivers considered in developing its 2012 Environmental Compliance Plan, I assisted in the drafting of Mark Hite's testimony and the responses to requests for information that he sponsored in this proceeding, and I have been directly involved in the financial modeling of the various options Big Rivers has in the event of the loss of the smelter load.

Q. Please describe your job responsibilities.

A. I report to the Director of Finance. My responsibilities include preparing Big Rivers' financial model, performing economic analysis, and analyzing financials.

Q. Briefly describe your education and work experience.

A. I have been employed by Big Rivers in the finance and accounting area since 2003 and have been performing the financial modeling function since July of 2009. I earned a Master of Science in Accountancy degree from the University of Southern Indiana and a Bachelor of Science in Accounting degree from Kentucky Wesleyan College. I am a Certified Public Accountant ("CPA") and a Certified Management Accountant ("CMA"). A summary of my education and work experience was filed on July 27, 2012, as Exhibit Siewert-1.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club.

Q. On page 14 of his testimony, Mr. Kollen states, "The discounting is performed on an annual basis using the Company's weighted cost of debt grossed-up for the contract TIER of 1.24 to an overall discount rate of 7.93%." Is this statement correct?

A. No. Big Rivers discussed the discount rate it used in its response to Item 25 of the Commission Staff's First Request for Information and provided a calculation of the cost of capital in its response to Item 11b of the Sierra Club's Third Request for Information. The discount rate used in this

analysis, 7.93%, is Big Rivers' 2010 cost of capital and is composed of cost of debt, depreciation and amortization, property taxes, and property insurance.

Q. On page 14 of his testimony, Mr. Kollen suggests that an "all-in" approach to the net present value ("NPV") analysis would be preferable to a "to-go" approach. Did Big Rivers prepare an "all-in" NPV analysis?

A. Yes. Big Rivers' response to Item 2d of KIUC's First Request for Information ("KIUC 1-2d") contains an attachment titled "Present Value of Members' Revenue Streams." This attachment summarizes the NPV of Big Rivers' rate payers' "all-in" revenues for the Base Case, Build, Partial Build, Buy, Build (Smelter Leave), and Buy (Smelter Leave) scenarios.

Q. Were the results of the "all-in" NPV analysis comparable to the "to-go" NPV analysis?

A. Yes. As stated in Big Rivers' response to KIUC 1-2d, "This analysis yielded very similar results when compared to Exhibit Hite-4 (a summary of the NPV tabs), and results in the same conclusion." Stated another way, whether you perform the analysis on a NPV cash flow basis or on a Member "all-in" revenue basis, the conclusion is the same. The Build Case results in lower cost to the Members than the Buy Case.

Q. On page 15 of his testimony, Mr. Kollen asserts that Big Rivers failed to include TIER on interest expense in the NPV analysis and

should not have included level debt service. Has Big Rivers previously addressed these assertions?

A. Yes. These are not errors. The assertions concerning TIER and level debt service were addressed in Big Rivers' response to Item 2c of KIUC's First Request for Information, in which Big Rivers stated, "The analysis measured the change in cash flows, on a present value basis, as compared to the 'Base Case'. The analysis assumed 28-year level debt service and included not only interest payments but also principal payments. If one were to include a TIER component in the analysis, the principal payments must be removed from the level debt service." Again, a NPV analysis based on "all-in" Member revenues, which would include a TIER component and exclude debt principal payments, was submitted in response to KIUC 1-2d.

Q. On page 20 of his testimony, lines 10 and 11, Mr. Kollen addresses the smelter load loss sensitivities and states that, "the Company's NPV analyses incorrectly assume that the Smelter revenues will continue." Is this correct?

A. No. Neither of the smelter load loss sensitivities contains smelter revenues beyond 2013. The NPV tab shows the net incremental environmental compliance cost for each of the scenarios. Big Rivers previously addressed this concern in its response to Item 2f of KIUC's First Request for Information. It may be helpful to note that the Build Smelter Load Loss sensitivity is really only comparable to the Buy Smelter Load Loss

sensitivity. Neither can be directly compared to the cases that include the smelter load; they can only be compared to one another. They both have overall lower Member cost than the scenarios with smelter load, but they also have fewer Member MWhs to spread those costs over. The intent is not to compare the smelter load loss sensitivities to the cases with smelter load, but to compare the smelter load loss sensitivities against one another to determine which is the least cost option on a NPVRR basis. Even in the absence of smelter load, the Build Case was the least cost option.

Q. Does Mr. Kollen's analysis indicate that the KIUC Build Case is the least cost option?

A. Yes. According to the table on page 25 of Mr. Kollen's testimony, the KIUC Build Case results in $122.16 million less required customer revenue over the 15-year period when compared to the KIUC Buy Case, or $52.80 million on present value basis.

Q. Does Mr. Kollen's analysis indicate that the KIUC Build case is the least cost option in a smelter load loss situation?

A. Yes. According to the table on page 25 of Mr. Kollen's testimony, the KIUC build smelter load loss case results in $90.86 million less required customer revenue over the 15-year period when compared to the KIUC buy smelter load loss case, or $66.98 million on a present value basis.

Q. Do you agree with Mr. Kollen's conclusion that the Build Case and the Buy Case are "approximately equivalent" and Mr. Hayet's

conclusion that there is "no clear economic advantage" between the Buy and Build cases?

A. No. The differences in NPVRR of $52.80 million and $66.98 million that I just described are not "approximately equivalent" in my view. The differences are significant to Big Rivers and its members, and show a clear economic advantage of the Build Case over the Buy Case.

Q. On page 20 of his testimony, Philip Hayet asserts that the HMP&L Station Two Units 1 and 2 ("HMP&L 1&2") variable operating and maintenance ("VO&M") costs that Big Rivers used in its financial analysis do not match what Big Rivers indicates should have been used in the production cost model. Do you agree with Mr. Hayet's assertion that this is an error?

A. No. HMP&L 1&2 VO&M costs in the production cost model are gross of the City of Henderson's share of HMP&L 1&2. Variable costs at HMP&L 1&2 are split between Big Rivers and the City of Henderson based on energy usage. Big Rivers is only responsible for its share of the variable costs. Therefore, Big Rivers' financial model only includes Big Rivers' share of the VO&M costs at HMP&L 1&2. Since Mr. Hayet lists this as one of his modeling "corrections," it would appear that he has incorrectly included the City of Henderson's share of VO&M costs at HMP&L 1&2 and has therefore overstated Big Rivers' expenses.

Q. On page 30 of her testimony, Ms. Wilson asserts that Big Rivers' analysis was flawed because it modeled a selection of future costs associated with retrofits rather than the actual forward going running costs of the units. Do you agree with Ms. Wilson?

A. No. Big Rivers' financial model contains the forward going running costs of its units, including environmental compliance retrofits for each scenario modeled. The Present Value of Members' Revenue Streams or "all-in" Member revenue requirement was provided as an attachment to Big Rivers' response to KIUC 1-2d. This attachment depicts the Member revenue stream required to cover all of Big Rivers' costs over the 15 year period and to generate a required TIER. Exhibit Hite-4 shows the incremental environmental compliance costs on a net present value cash flow basis. Costs that are the same under each option modeled, including on-going running costs, are not included in Exhibit Hite-4 because they would have no impact on the net present value – but they are included in the financial model.

Q. On page 9 of his testimony, Dr. Steinhurst asserts that Big Rivers' analysis was flawed because it did not include ongoing operating and maintenance ("O&M") costs at each of Big Rivers' coal units. Do you agree with Dr. Steinhurst?

A. No. Big Rivers' financial model contains all of the existing O&M costs at each of its units plus the additional O&M costs for the retrofits included in

each scenario modeled. Costs that were the same under all scenarios modeled were not included in Exhibit Hite-4 because they would have no impact on the net present value – but they are included in the financial model.

Q. In the testimony filed on behalf of Sierra Club, Ms. Wilson and Dr. Steinhurst assert that Big Rivers' analysis is flawed because Big Rivers did not include the costs to comply with NAAQS, CCR, 316(b), and effluent limitations. Do you agree?

A. No. Big Rivers did model a sensitivity including compliance with CCR and 316(b) for its response to Item 4 of the Commission Staff's Second Request for Information, and the inclusion of those costs does not change the conclusion that the Build Case is the least cost option. Big Rivers did not model a sensitivity including compliance with NAAQS and effluent limitations due to the uncertainty surrounding those potential regulations as discussed by Mr. Shaw and Mr. Berry.

Q. In the testimony filed on behalf of Sierra Club, Ms. Wilson and Dr. Steinhurst assert that it would be less expensive for Big Rivers to retire all of its coal units and to replace them with new natural gas combined cycle ("NGCC") units. Is this a feasible option?

A. No. Retiring Big Rivers' coal units and constructing new NGCC units is not a feasible option, for several reasons. The first issue with Sierra Club's proposal centers on Big Rivers' current debt. As of June 30, 2012, Big

Rivers had $794 million in long-term debt on its balance sheet. If Big Rivers were to retire its existing generating fleet, Big Rivers would also have to pay off its existing creditors because this transaction would eliminate the existing creditors' collateral. To accomplish this, Big Rivers would have to find a lender willing to loan not only the amount required to build the new NGCC units, but also an additional $794 million to retire the existing debt, leaving the new creditor in an extremely under-collateralized position. Finding a lender willing to accept $794 million less in collateral than the amount loaned is unlikely.

Second, to further complicate a borrowing of this nature, the existing RUS Series B Note was carried on Big Rivers' June 30, 2012, balance sheet at $127 million for GAAP financial statement purposes; however, the stated amount of the note, or pay-off amount, was $246 million. This would result in an additional $119 million required to pay off Big Rivers' existing creditors and put the NGCC creditors in an under-collateralized position of $913 million ($794 million plus $119 million). The RUS Series B Note is a non-interest bearing note with a stated amount of $246 million maturing December 2023. The note is carried on Big Rivers' GAAP financial statements at a discounted amount with an imputed interest rate of 5.8%.

Third, Sierra Club's proposal would have an adverse effect on Big Rivers' equity and debt ratings. Big Rivers has net coal generating plant of $871 million, excluding items in construction, as of June 30, 2012. Retiring

Big Rivers' coal generating fleet would trigger a loss of $871 million and flip Big Rivers' June 30, 2012 positive $391 million equity to negative $480 million, not including the $119 million loss Big Rivers would realize on the RUS Series B Note mentioned above. This enormous reduction in equity would certainly negatively affect Big Rivers' credit ratings and ability to borrow.

Q. Please refer to the Gen Assumptions tab in the file titled "BREC cash flow - v16 - AllEnv.xlsx" provided by the Sierra Club in response to KIUC's First Request for Information where a nominal discount rate of 7.93% is utilized. Would a discount rate of 7.93% be appropriate given Sierra Club's proposal?

A. No. Given the substance of Sierra Club's proposal, a much higher discount rate should be utilized in Sierra Club's analysis. As stated previously, the discount rate utilized by Big Rivers in its analysis is Big Rivers' 2010 cost of capital, which is comprised of 5.73% cost of debt, 1.88% depreciation and amortization, 0.16% property taxes, and 0.16% property insurance. Sierra Club's analysis assumes a 5.0% depreciation rate for the new NGCC units. Since Sierra club's proposal involves retiring Big Rivers' entire generating fleet and replacing it with NGCC units, Big Rivers' depreciation rate will be 5.0% rather than 1.88%, effectively increasing Big Rivers' cost of capital by 3.12 percentage points, to 11.05%.

In addition to increased depreciation rates due to Sierra Club's proposal, Big Rivers' cost of debt would also increase given the negative effects of Sierra Club's proposal on Big Rivers' debt structure and equity position. An increase in the cost of debt in addition to the increased depreciation rates mentioned above would boost Big Rivers' cost of capital even higher than 11.05%. Thus, the use of a 7.93% discount rate in the Sierra Club's analysis is flawed; a much higher discount rate should be used.

Q. On pages 29 and 31 of his direct testimony Mr. Kollen questions Big Rivers' ability to finance the $283.49 million of ECP projects (specifically project 4 and 5). Do you agree that Big Rivers' ability to finance ECP projects 4 and 5 is questionable?

A. No. Big Rivers is confident that it will be able to obtain the financing necessary to cover the costs of all the ECP projects, including projects 4 and 5. Big Rivers has in place a plan to obtain a construction revolver (bridge financing) for up to $300 million from National Rural Utilities Cooperative Finance Corporation ("CFC") and a term loan from the RUS to provide permanent financing.

On page 31 of his direct testimony Mr. Kollen references Big Rivers' Second Updated response to Item 43 of KIUC's First Request for Information. This update consists of the minutes from the meeting of the Board of Directors ("Board") for June 15, 2012. It documents the Board of

Directors' action taken to provide authorization to certain members of senior management ("Authorized Representatives") to move forward in the process of "obtaining from CFC a revolving credit agreement in an amount not to exceed $300 million, for a term not to exceed five years, including such other terms and conditions as the Authorized Representatives believe are in the best interest of the Corporation...." In addition, the June 15, 2012, Board minutes document the Board's authorization for management to file with RUS a term loan application in an amount of the ECP projects, including projects 4 and 5. Big Rivers anticipates filing its RUS term loan application in late August 2012.

Q. Has Big Rivers successfully completed any financings since the closing of the transaction that unwound Big Rivers' 1998 lease with E.ON U.S. LLC and its affiliates (the "Unwind")?

A. Yes. Big Rivers has been successful in completing all financing transactions it has pursued since the closing of the Unwind. In June 2010, Big Rivers completed a financing transaction in which it was able to refund $83.3 million of variable rate Pollution Control Bonds through issuing $83.3 million of fixed rate Pollution Control Bonds. On July 27, 2012, Big Rivers was successful in closing two term loans, one with CoBank in the amount of $235 million and the other with CFC in the amount of $302 million. Both CoBank and CFC were aware of Century's recent statements regarding the potential for closing its operations if it did not obtain significant financial

support in the near future; and the lenders' willingness to close these sizable term loans indicates to Big Rivers that securing financing for the 2012 Plan is not a concern that justifies the rejection of projects 4 and 5, as Mr. Kollen recommends on page 32 of this testimony. It should also be noted that Fitch Ratings recently reaffirmed Big Rivers BBB- rating on the $83.3 million County of Ohio, Kentucky's pollution control refunding revenue bonds series 2010A.

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. The intervenors' alleged errors relating to Big Rivers' financial modeling discussed herein are not errors and have no impact on the conclusion that Big Rivers' 2012 Environmental Compliance Plan is the most cost effective approach to meet the requirements of the environmental regulations described by other witnesses on behalf of Big Rivers in this proceeding. As such, the Commission should approve Big Rivers' 2012 Environmental Compliance Plan as filed.

Q. Does this conclude your rebuttal testimony?

A. Yes.

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

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REBUTTAL TESTIMONY

OF

JOHN WOLFRAM
PRINCIPAL
CATALYST CONSULTING LLC

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
JOHN WOLFRAM

I. INTRODUCTION

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

A. My name is John Wolfram. I am the Principal of Catalyst Consulting LLC. My business address is 3308 Haddon Road, Louisville, Kentucky, 40241.

Q. Did you submit direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to certain of the alleged errors claimed in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club, and also to respond to the KIUC's proposed method for allocating environmental surcharge revenues.

II. ALLEGED ERRORS

Q. On page 29 of his testimony, Lane Kollen states, that "if the Commission authorizes Big Rivers to proceed with ECP projects 4 and 5, then it will commit the Company, its creditors, and all of its customers to the completion of the projects, the financing of the

projects, and the obligation to pay through rates for the projects."
Do you agree with that statement?

A. No. The statement ignores the flexibility that the Company, its creditors, its members and the Commission have to adapt to changing circumstances, particularly in the short term. If the Commission approves Big Rivers' application and then a material change in circumstances occurs, Big Rivers would not be compelled to move forward with the construction of the projects in the 2012 Environmental Compliance Plan, but instead retains the ability to revisit the issue, refresh its analyses, and return to the Commission. Big Rivers' creditors are not committed by the Commission's Order to the financing of the projects; financing decisions are undertaken separately from the instant case. Big Rivers' members are not committed without bound to pay for the projects; the members can participate in the six-month and two-year reviews undertaken by the Commission, and they can also ask the Commission to initiate an investigation at any point in time. All of these entities – Big Rivers, its creditors, and its members – have additional avenues available should circumstances change. The particular options available will depend upon the nature and timing of any such material change. And of course, the Commission retains jurisdiction over what costs get passed through the environmental surcharge mechanism. For these reasons, Mr. Kollen's statement that the Commission's approval in this case commits the Company, its creditors, and

all of its customers to the completion of the projects, the financing of the projects, and the obligation to pay through rates for the projects is an overstatement and should be disregarded by the Commission.

Q. On page 5 of his testimony, Philip Hayet asserts that the Buy Case is superior and less risky than the Build Case given the possibility of additional undiscovered errors in Big Rivers' analysis. Do you agree that the possibility of undiscovered errors in Big Rivers' analysis makes the Buy Case superior and less risky?

A. No. Of course the possibility of undiscovered errors exists in any analysis, including Mr. Hayet's analysis. It is not correct that if any undiscovered errors do exist, correcting them would necessarily favor the Buy Case. KIUC has not demonstrated that any such errors would automatically favor one case over another. The claim is specious and provides no basis for denying Big Rivers' application.

Q. On pages 24 and 25 of his testimony, Mr. Hayet states that if the smelters ceased operations, Big Rivers would become a merchant generator and that it would be "even riskier" for Big Rivers to become a merchant generator. Do you agree?

A. No. First, it is not a foregone conclusion that absent the smelter load Big Rivers would become a "merchant generator." Big Rivers has several options available to it should the smelters terminate their service agreements, as described by Mr. Berry in the attachments to the response

to Item 26 of the Commission Staff's First Request for Information, and characterizing any of them as "becoming a merchant generator" is a significant oversimplification. Second, Mr. Hayet offers absolutely no evidence supporting his alarmist conclusion that it would be riskier for Big Rivers to become a merchant generator, nor does he demonstrate that Big Rivers will encounter difficulty "surviving" as a merchant generator. In a table on page 25 of his testimony, Mr. Hayet lists merchant generating entities that have gone bankrupt since 2000. Mr. Hayet claims that this is "all the more reason to be concerned about Big Rivers becoming a merchant generator" but he in fact provides *no* reason for any concern; he does not describe any of these entities or their operations, does not explain why any of these entities failed, and does not show that Big Rivers is in any way similar to these entities. The implication that if Big Rivers attempts to operate without the smelter load then Big Rivers will somehow become akin to Enron is extreme, unsupported, and inappropriate.

Q. On page 23 of his testimony, Mr. Kollen criticizes Big Rivers for not performing elasticity studies. Do you agree with that criticism?

A. No. Mr. Kollen mischaracterizes Big Rivers' responses to Item 22 of the Attorney General's First Request for Information and Item 14 of the Commission Staff's Second Request for Information. In these data responses, Big Rivers did not state that end use consumers will not respond to significant rate increases if such increases occur. The intent of those

responses is to explain that Big Rivers did not conduct a price elasticity study in association with the proposed increase in environmental surcharge costs in this case, because the proposed increase in 2016 for the Rural rate class is 6.9% (without consideration of the rate mitigation provided by the MRSM and RER tariffs) and for the Large Industrial rate class is 6.1%. The responses pertained to the rate impacts of the Build Case, not to the rate impacts on the Rural and Large Industrial members if the smelters were to terminate their service agreements. Mr. Kollen blurs that distinction and instead mischaracterizes the responses to support his false claim that Big Rivers incorrectly modeled the smelter load loss scenarios in its sensitivity analyses.

Q. Sierra Club alleges that Big Rivers did not evaluate a reasonable range of alternatives. Do you agree?

A. No. Big Rivers did consider a reasonable range of alternatives. A major element of the Sierra Club claim is that Big Rivers did not consider the retirement of its coal fleet and the construction of new natural gas combined cycle ("NGCC") plants. However, the retirement of Big Rivers' coal units and implementation of NGCC plants is not viable, for the reasons discussed in the rebuttal testimonies of Mr. Berry and Mr. Siewert. Another element of the claim is that Big Rivers did not consider the impacts of DSM and Energy Efficiency. However, Big Rivers did consider the effects of DSM and concluded that they were insignificant, as discussed by Mr.

Berry in his direct testimony and in discovery. Big Rivers did consider a number of alternatives, as outlined by Mr. Berry and by Mr. DePriest in their direct testimonies. For these reasons, the assertion that Big Rivers did not consider a reasonable range of alternatives is not correct.

Q. On page 7 of his testimony, Dr. Steinhurst claims that Big Rivers' analysis creates a bias in favor of additional future environmental retrofits. How do you respond?

A. Mr. Steinhurst acknowledges that some emerging regulations are in flux and costs may be uncertain, but his conclusion that totally ignoring these costs biases the analysis in favor of the proposed environmental retrofits is not supported. The inclusion of costs that are uncertain would add uncertainty to both the Buy Case and the Build Case; any cost increases for power production could affect Big Rivers' generation facilities as well as the energy prices in the wholesale market. Sierra Club does not provide any evidence that the exclusion of compliance alternatives for regulations that are emerging or uncertain creates a bias in favor of the Build Case.

Q. On page 9 of his testimony, Dr. Steinhurst says that Big Rivers' failure to present sensitivity cases is not good utility practice. How do you respond?

A. I disagree with the premise that Big Rivers failed to present sensitivity cases. Big Rivers incorporated analysis of several variables into its cost effectiveness evaluation. First, Big Rivers did not rely on a single estimate

of market prices. Big Rivers used power price forecasts from both Pace Global ("Pace") and ACES Power Marketing. The use of the Pace forecast serves as a higher-price sensitivity and the use of the ACES forecast serves as a lower price sensitivity. As explained in the Rebuttal Testimony of Patrick Augustine, the Pace prices (fuel, power, and allowance prices) themselves incorporate an expected value analysis, and thus those prices include within them the various risks Pace incorporated into its analysis. Second, Big Rivers included sensitivities to load values by evaluating the smelter load loss cases, so that the cases with the smelters serve as base-load sensitivity and the cases with smelter load loss serve as a low-load sensitivity. In this way, Big Rivers did not rely on single estimates, and did not fail to conduct sensitivity studies as part of its cost effectiveness evaluation.

Q. KIUC asserts that the rate impact on members if there are smelter load losses supports the Buy Case. Do you agree?

A. No. That assertion is unsupported, is false, and contradicts other KIUC testimony. According to Big Rivers' and Mr. Hayet's analyses, the Build Case is the more cost effective option on a NPVRR basis, and therefore the Build Case, not the Buy Case, would have less of a rate impact on Big Rivers' members.

Q. KIUC claims that the Commission should do everything possible to retain the smelter load. How do you respond?

A. The Commission should consider the impacts on all of Big Rivers' rate classes in its decision-making, consistent with KRS 278.170(1). This includes the smelters as well as the Rurals and Large Industrials. Practically speaking, in the instant case, the rate impacts are dependent upon two variables – the amount of the increase and the allocation of that amount among the rate classes. I discuss the second point in the next section of my testimony; for the first point, the total increase to all of the classes will be lower under the Build Case than they will be under the Buy Case. Thus, the Commission should approve the Build Case because it is the most cost effective alternative for allowing Big Rivers to comply with the environmental regulations described by Mr. Shaw in his direct testimony.

Q. Is KIUC's claim that the Commission should do everything possible to retain the smelter load consistent with its recommendation that the Buy Case is superior?

A. No. The KIUC recommendation regarding smelter retention is inconsistent with the KIUC recommendation to reject the Build Case and accept the Buy Case. By both Big Rivers' and KIUC's analyses, the Build Case has a lower NPVRR than the Buy Case. This means that the Build Case will result in a lower cost to the smelters than would the Buy Case. And yet the KIUC recommends that the Commission approve the Buy Case alternative. The two recommendations are mutually exclusive; either the Commission

should promote retention of the smelter load by minimizing cost increases, or the Commission should approve the more costly compliance plan; it cannot logically do both.

Q. Has KIUC provided any evidence establishing that its proposals regarding the Buy Case will have an impact on whether the smelters stay in business?

A. No. The KIUC discusses the potential loss of the smelter load at great length in their testimony, but does not make plain what that risk has to do with the environmental compliance alternatives proposed in this case. If the Buy Case and the Build Case are "basically a wash" on a NPVRR basis, as Mr. Hayet claims on page 5 of his testimony, then there is no reason for either alternative to better position the smelters to remain in business. KIUC provides no evidence or basis for the implication that the Buy Case is more likely than the Build Case to help the smelters avoid the termination of their service agreements. The KIUC testimony related to the effects of smelter load loss distracts from the real question of cost-effective compliance, does not influence the results of the cost effectiveness evaluation, and provides no basis for the Commission to deny Big Rivers' application in this case.

III. REVENUE ALLOCATION METHOD

Q. KIUC proposes a revenue allocation methodology that is slightly different than Big Rivers' proposal. Can you explain the differences?

A. Yes. There are differences both in the formulas and in the process of applying them. First, the formulaic difference between the two proposals is that Big Rivers includes revenues from fuel – both the fuel-related portion of base rates and Fuel Adjustment Clause ("FAC") revenues -- in determining its Total Adjusted Revenues allocation, KIUC excludes those fuel revenues in its Net Revenues allocation. Second, the process difference between the two proposals is that Big Rivers proposes to use the Total Adjusted Revenues method indefinitely, but the KIUC proposes to use Net Revenues only until the funds in certain reserve accounts are depleted, at which time the Total Adjusted Revenues method should be used from then on.

Q. Does Big Rivers agree that the KIUC proposal should be adopted?

A. No.

Q. Why is the KIUC's proposal inappropriate?

A. KIUC's proposed revenue allocation method will have a detrimental effect on the non-smelter rate classes, is not reasonable, and should be rejected. The KIUC proposal basically shifts costs from the smelters to the non-smelter rate classes by using allocators that exclude fuel revenues. More importantly, the KIUC proposal gives the smelters access to certain reserve

accounts that were established at the unwind for the benefit of Big Rivers' non-smelter members and transfers funds from those accounts to the smelters.

Q. KIUC suggests that the proposal does not adversely impact Big Rivers' non-smelter members. Is this correct?

A. No. KIUC's position is that there is no harm because those additional costs will be absorbed by Big Rivers' Economic Reserve ("ER") and Rural Economic Reserve ("RER") funds, both of which were approved by the Commission in the unwind case, Case No. 2007-000455. In reality, that absorption constitutes the very harm that the KIUC contends does not exist. The ER was established to offset FAC and Environmental Surcharge costs to the Rural and Large Industrial classes, and the RER was established to offset FAC and Environmental Surcharge costs to the Rurals after the ER was exhausted. Both funds were established in exchange for the Rurals (for both the ER and RER) and Large Industrial (for the ER) rate classes paying higher rates and facing greater risks after the unwind as a result of Big Rivers agreeing to serve the smelters. Because KIUC's proposal shifts environmental surcharge costs from the smelters to the other customers, the funds will run out sooner than they would under Big Rivers' proposal. The important point is not that the funds run out sooner, but *why* the funds run out sooner; the funds are depleted more quickly because under KIUC's proposal, a portion of the reserve funds are

essentially transferred to the smelters because the reserve funds are being used to offset environmental surcharge costs that the smelters would otherwise pay. This transfer of funds to the smelters from accounts reserved for Big Rivers' non-smelter members has an adverse impact on those non-smelter members.

Q. Can the adverse impact of the KIUC's proposal be quantified?

A. Yes. According to the KIUC's response to Staff Item1 and to Big Rivers Item 1, KIUC's proposal will result in a transfer from the non-smelter members to the smelters of $3,595,190 in 2016, and up to $3,692,021 in 2017. This results a total transfer in the range from $3.6 million to $7.3 million (depending upon which month in 2017 the reserve accounts become fully depleted). However, the new allocation method will also be in place for 2013 through 2015, and would apply to the original 2007 environmental compliance plan projects as well as to the 2012 Plan -- so the amount of the transfer is not limited to 2016 and 2017. Big Rivers estimates that the KIUC proposal will channel $1.7 million in 2013, $1.8 million in 2014, $1.2 million in 2015, $3.4 million in 2016, and $2.5 million in 2017 from the reserve accounts to the smelters. Big Rivers estimates that in total, the KIUC method will transfer $10.6 million from the reserve accounts to the smelters from 2013 through 2017.

Q. KIUC recommends that after the reserve accounts are depleted, the environmental surcharge should revert from the Net Revenue

method to the Total Adjusted Revenue method. How do you respond to this recommendation?

A. The KIUC proposal to revert to Big Rivers' proposed method after the reserve accounts are depleted only supports the view that the KIUC proposal is a thinly-veiled attempt to gain the smelters access to the funds in the reserve accounts. Functionally, the reasonableness of any environmental surcharge cost allocation methodology is not related in any way to the reserve account funds. Any cost allocation methodology should stand on its own merits, and should remain in place so long as those merits remain. The reasonableness of applying either method should not be a function of whether the reserve accounts are funded or depleted.

Q. How does the KIUC's proposal compare to Commission precedent?

A. The Commission has approved an allocation method based on total revenues (i.e. including revenues related to fuel) numerous times for other utilities in Kentucky, including East Kentucky Power Cooperative, Kentucky Power Company, Louisville Gas & Electric Company ("LG&E"), and Kentucky Utilities Company ("KU"). The Big Rivers proposed allocation method is consistent with this practice. The method cited by Mr. Baron that was approved by the Commission for KU and LG&E in Case Nos. 2011-00161 and 2011-00162, respectively, is unique and was the result of a settlement, which the parties agreed would not have any precedential value in this or any other jurisdiction.

Q. What is your recommendation regarding the KIUC's revenue allocation proposal?

A. The KIUC's proposal is merely an attempt to transfer $10.6 million to the smelters from reserve accounts that were established for the benefit of Big Rivers' non-smelter members at the unwind. The proposal is not reasonable, is not consistent with Commission precedent, and should not be accepted by the Commission.

IV. CONCLUSION

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. The errors discussed herein that KIUC and Sierra Club claim that Big Rivers made in its analysis are not errors and do not change the fact that Big Rivers' 2012 Environmental Compliance Plan is the most cost effective approach to meet the requirements of the existing and proposed environmental regulations described by other witnesses on behalf of Big Rivers in this proceeding. As such, the Commission should approve Big Rivers' 2012 Environmental Compliance Plan. Also, Big Rivers' proposed allocation of the environmental costs is consistent with Commission practice and preserves the ER and RER for the Large Industrials and Rurals, as they were intended, and so, the Commission should deny the

KIUC's proposed allocation methodology and approve the allocation methodology proposed by Big Rivers.

Q. Does this conclude your rebuttal testimony?

A. Yes.

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

OF

BRIAN J. AZMAN
DIRECTOR OF STRUCTURING
ALLIANCE FOR COOPERATIVE ENERGY SERVICES POWER MARKETING

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
BRIAN J. AZMAN

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

A. My name is Brian J. Azman. I am the Director of Structuring for the Alliance for Cooperative Energy Services Power Marketing, also known as ACES Power Marketing ("APM"). My business address is 4140 West 99th Street, Carmel, Indiana 46032.

Q. What is APM?

A. APM was created by several generation and transmission cooperatives ("G&Ts"). It provides services such as energy trading and energy risk management. APM is wholly owned by its members, all of which are Rural Electric Cooperatives, including Big Rivers Electric Corporation ("Big Rivers") and East Kentucky Power Cooperative. APM provides a full suite of risk management services to its members and other participants in the energy industry, including municipals, large industrials, developers and trading companies. APM's services include front office (trading, scheduling, origination, FTRs, portfolio modeling), mid-office (deal confirmations, credit, contracts, mark-to-market and forward prices) and back office (settlements, both for bilateral contracts and ISO interactions). Note also that APM does not trade for its own account – all transactions are performed "as agent for" one of its members or non-member customers.

Q. Please describe your job responsibilities.

A. As Director of Structuring, I am responsible for a group of 7 quantitative analysts. My group performs ongoing portfolio modeling and reporting for 18 of our 19 members plus 8 non-member customers. The main goals of the modeling/reporting are to estimate cost-to-serve native load and the risks around that cost-to-serve. The modeling is part of APM's monitoring of hedge policy compliance. The modeling is used to evaluate potential hedges vs. risk reduction and utilization, and to value the purchase or sale of generating facilities, including Purchase Power Agreements for generating facilities (for example, wind generation). In addition to the 26 members/clients who take ongoing modeling services, we provide ad hoc services to a number of non-member customers. As Director of the group, I have worked on the selection and implementation of our current software (Planning and Risk), testing and implementation of new features and ad-hoc analyses for current and new clients.

Q. Briefly describe your education and work experience.

A. A summary of my education and work experience is provided in the attached Exhibit Azman Rebuttal-1.

Q. Did you submit direct testimony in this proceeding?

A. No, but I have sponsored several of Big Rivers' responses to requests for information in this matter.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club.

Q. What was APM's role in Big Rivers' consideration of its environmental compliance options in the development of Big Rivers' 2012 Environmental Compliance Plan?

A. APM performed a number of planning model/production cost model runs to assist Big Rivers' consideration of its environmental compliance options. For all model runs, APM used inputs (generation parameters, load) from Big Rivers and fuel and allowances price projections from Pace Global. For some of the model runs, APM also used power price projections from Pace Global, while APM used its own power price projections for the remaining runs/sensitivities. APM then provided the results of its modeling to Big Rivers.

Q. Have you analyzed the alleged errors in APM's planning modeling asserted by Mr. Hayet and Ms. Wilson?

A. Yes. Exhibit Azman Rebuttal-2 attached hereto lists each alleged error relating to the APM model runs, states whether each alleged error is correct, and explains whether each alleged error has any impact on the conclusion that the Build Case is the least cost option.

Q. Please summarize the results of your analysis of the alleged errors.

A. Most of the alleged errors were not in fact errors. The few legitimate errors that KIUC or Sierra Club did discover have no material impact on the result of the cost effectiveness evaluation demonstrating that the Build Case is the least cost option.

Q. On pages 24 and 25 of his testimony, Philip Hayet states that losing the smelter load and investing $300 million means that Big Rivers would become a merchant generator with only coal-fired generation to sell. Do you agree?

A. No. As shown on Big Rivers' Load Concentration Analysis and Mitigation Plan (which Mr. Berry discusses in Big Rivers' responses to Items 44-69 of KIUC's Second Request for Information), becoming a merchant generator is not Big Rivers' only option if the smelters cease operations. Moreover, in the context of this case, the best chance of keeping the smelter load is to select the least cost option to comply with the environmental regulations identified in Big Rivers' 2012 Environmental Compliance Plan, which is the Build Case. Even Mr. Hayet's analysis shows that the Build Case is the least cost option -- and that analysis relies on the lower APM price forecast and includes a number of erroneous changes made by Mr. Hayet that favor the Buy Case.

Q. Why did APM not agree to KIUC's invitation to have their consultant come to APM office and sit with APM's analyst to run cases?

A. APM is an independent Delaware limited liability company that is owned by nineteen (19) Rural Electric Cooperatives. Big Rivers is one of the nineteen (19) members of APM. As an energy services company providing services to multiple entities within the energy industry, APM must exercise a high degree of security and confidentiality regarding its clients' data. Therefore, to allow a third-party consultant (and potential direct competitor) into our secure facility invites a potential unnecessary risk to the security and confidentiality of APM and our clients' data when adequate alternate means of achieving the same objective are available. Second, KIUC's consultant sought access to software on APM's systems for which APM is contractually bound to protect from disclosure. As such, to honor KIUC's request would be in direct violation of APM's software license agreement with its software provider, Ventyx/ABB. Moreover, APM's software vendor Ventyx/ABB would not authorize any viewing, reviewing or use of their software or any materials associated with it, including software documentation and software-created output files, by an unlicensed party. At the time of KUIC's request, their consultant was not licensed by Ventyx/ABB. Accordingly, APM was contractually bound to prevent disclosure to KIUC's consultant. Finally, providing access to APM's facility

did not represent the least intrusive means of accomplishing KUIC's interest in accessing information while avoiding unnecessary disruption and interference within APM's workplace.

Q. Why did APM initially refuse to provide its database to the intervenors in this case?

A. For the same reasons as above. The APM database contains confidential information from its members and clients, and APM did not have the other members' and clients' permission to turn their confidential information over to the intervenors. This is done because the volume of data required to have a separate database for each member or client would be tremendous. Also, APM did not believe it had the tools or ability to remove the non-Big Rivers information from the database. The database is also part of the Ventyx/ABB software, and APM would have been in violation of its software license had it turned the database over to the intervenors until they had obtained a license themselves.

Q. Mr. Hayet says that APM did not "provide a file containing all run definitions." Is that correct?

A. Yes. However, APM provided, via Ventyx/ABB, a database to Mr. Hayet containing a sample run definition and all necessary inputs, including all "scenarios" required to run the cases, along with a file containing which scenarios went with each case.

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. As shown on Exhibit Azman Rebuttal-2, the intervenors' alleged errors with APM's modeling are either wrong or have no material effect on the fact that Big Rivers' 2012 Environmental Compliance Plan is the most cost effective approach to meet the requirements of the existing and proposed environmental regulations described by other witnesses on behalf of Big Rivers in this proceeding.

Q. Does this conclude your rebuttal testimony?

A. Yes.

ACES POWER MARKETING

Brian Azman
Director of Structuring

Brian Azman joined ACES Power Marketing (APM) in May 2001 and has over 30 years of experience in the energy industry. He is currently Director of Structuring, responsible for a group of seven analysts running the portfolio model evaluating price risks for members and customers. Prior to his current role, he served as Director of Member-Client Services. Brian coordinated new and existing services and provides support for APM's western members: Brazos, Golden Spread, Western Farmers and Sunflower, as well as several customers including Sempra Generation, City of Roseville, Pasadena and Glendale and PWRPA. In previous roles at APM Brian was responsible for natural gas and fuel oil hedging via NYMEX and other derivative instruments, and worked closely with members and customers in developing their hedge strategies and educating management on the operations of financial hedging.

He began his career at Sohio/BP in Cleveland, Ohio. He has a diverse background and has held positions in engineering, operations, financial analysis, physical and financial trading, and risk management. Before joining APM, Brian was Risk Manager for ProLiance Energy in Indianapolis. As Risk Manager, Brian was responsible for financial trading, structured pricing and all storage activity. He also worked closely with ProLiance's parent companies, Vectren and Citizens Gas, on their fixed price purchase strategies.

He holds a Bachelor of Science degree in Chemical Engineering from the University of Illinois.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
1	Wilson incorrectly shut down in 2012	KIUC Mr. Hayet Page 18	No	N/A	• False • Wilson planned outage that was scheduled for spring 2012 in the Buy as well as the Build case. This outage was not due to conserving allowances.
2	Wilson VOM higher in Buy case than Build	KIUC Mr. Hayet Page 19	No	N/A	• True, but original set up is appropriate • Wilson equipment in the Build case is less expensive to operate on a $/MWh basis (better stone utilization; no additives; drier cake/lower disposal costs; etc.) so this is appropriate.
3	Wilson emit rate changed in 2015 instead of 2016	KIUC Mr. Hayet Page 19	Yes	No	• True • This was due to in-service date assumptions for Wilson being adjusted further after the model runs had already commenced.
4	Green 1 has "significantly higher" VOM in Build-no Smelter case	KIUC Mr. Hayet Page 19	No	N/A	• True, but original set up is appropriate. • The Green 1 VO&M rate was higher in the Build cases because it was the Green unit modeled with the SCR addition. The reagent for the SCR raised the G-1 VO&M rate. • The assumption as to which Green unit would get the SCR was also adjusted further after the model runs had already commenced. Because the units are practically identical, previous runs were not re-run.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
5	Green 2 VOM same in Build and Buy case	KIUC Mr. Hayet Page 19	Yes	No	• True • The in-service date assumption for Green 1 was adjusted further after the model runs had already commenced. As changes would need to be consistent throughout all the cases, previous runs were not re-run. • The assumption as to which Green unit would get the SCR was also adjusted further after the model runs had already commenced. Because the units are practically identical, previous runs were not re-run.
6	HMPL 1&2 have same VOM vs Berry testimony $800k	KIUC Mr. Hayet Page 20	No	N/A	• False • The assumption for HMPL 1&2 that drives higher VO&M in the Build cases is that beginning in 2014 the SO2 removal rates are increased due to running an additional spray header in the respective FGD systems. This results in greater reagent consumption and disposal per MWH. • In the Buy case, HMPL VOM starts at $4.08/MWH and rises to $8.70 with an average of $6.28/MWH • In the Build case, HMPL VOM starts at $4.08/MWH and rises to $9.10/MWH with an average of $6.53/MWH. • These VO&Ms are a little different due to unit specific differences like heat rates, etc.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
7	HMPL 1&2 Buy No Smelter has higher VOM than other cases	KIUC Mr. Hayet Page 20	Yes	No	• True • It appears that the VOM for HMPL in the Build and Buy cases were flipped in some of the DB scenarios that were selected for these runs. • Impact: HMPL VOM should increase in the Build cases starting in 2014, and averaging approx $0.30/MWh higher than the Buy cases • In the "Buy No Smelter" case referenced in the testimony, HMPL generation for 2014-2026 totals 29.6 million MWh • $0.30/MWh x 29.6 million MWh = $8.9 million vs total cost over 15 years of $4,862.7 million, or 0.2% difference
8	Build case has upgrade in 2014 vs Berry testimony in 2015	KIUC Mr. Hayet Page 20	No	N/A	• True • The in-service date assumptions for new HMPL 1&2 spare spray headers was adjusted further after the model runs had already commenced. This only means that in 2014 forward all spray headers were in service but the new spare headers were not installed yet. As changes would need to be consistent throughout all the cases, previous runs were not re-run.
9	Coleman dispatch constrained in 2013 vs compliance in 2016	KIUC Mr. Hayet Page 20	No	N/A	• True that dispatch is constrained in 2013 for all cases; original set up is appropriate • CSAPR also in effect in 2013; however, variability limit is assumed to be waived.
10	Coleman maintenance schedules should have been moved to coincide with constrained gen in Buy	KIUC Mr. Hayet Page 20	No	N/A	• False. • Maintenance is already planned for shoulder months, in periods of lower prices & loads • Even with maintenance periods, generation needed to be constrained in order to meet CSAPR limits – thus moving maintenance to the constrained periods would not help meet the CSAPR limits

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
11	Incorrect Monte Carlo setting used	KIUC Mr. Hayet Page 20	Yes	No	• True • The Monte Carlo setting used is more appropriate for Stochastic runs • When Ventyx/ABB brought this to APM's attention, this was tested and the difference in generation over 15 years is approx. 0.25% (for the "lower Green NOX" case) • Total Generation Cost is approx. 0.1% different with the updated setting.
12	Other modeling strategies should have been used	KIUC Mr. Hayet Page 23	No	N/A	• False. • APM has tested these strategies (annual limits and raising allowance prices) in the past (at Ventyx/ABB's suggestion) and found them less useful than constraining specific generation. These tests were done in calendar years 2010 and 2011 as CATR and CSAPR rules were being issued and revised. These strategies appeared to be more useful in fully tradable emissions markets, but less useful in a market that needs to constrain generation to meet an emissions limit. • Also, the premise for the Buy cases was to look to curtail the units with the highest SO2 and NOx emission rates first, since compliance was not optional. SO2 was the primary constraining factor in meeting compliance, and the Green and HMPL units have the lowest SO2 emission rates. Green units are slightly lower NOx emitters, and then a Green unit gets an SCR. The HMPL units are similar in NOX emissions to the Wilson unit. Therefore, it made sense to constrain Wilson and Coleman to meet compliance in the Buy cases. • Note also, Mr. Hayet did not test or employ these strategies in his model runs.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
13	Load forecast overstated because no DSM	SC Ms. Wilson Page 20	Yes	No	• True; addressed in Mr. Berry's testimony. • In addition, the LMPs for Big Rivers' nodes in the "loss of smelter load" scenarios were also estimated. Losing 65% of Big Rivers load resulted in LMPs only 7% lower over this time period (approximately $2/MWh from a base case of approximately $35/MWh.). Assuming a 1% change in load due to a DSM program would have resulted in a much smaller change in LMPs. Since generation in an ISO is determined by LMP, not specifically by native load, change in generation output would be negligible. Further, the loss of load from DSM would largely be On-Peak (when Big Rivers' generation is typically economic). Some of this load would be shifted to other time periods, with the potential to *raise* LMPs in those hours (again, the change would be small). However, the raising of LMPs in Off Peak hours could potentially *raise* Big Rivers' generation, offsetting the claimed CSAPR impacts of lower on-peak generation.

Big Rivers Electric Corporation
Case No. 2012-00063
Listing of Intervenors' Alleged Errors in APM Model Runs

#	Alleged Error	Cite	Legitimate Error?	Is Impact on Buy vs. Build Significant?	Comment
14	Capacity, Heat Rates, EFOR incorrect because constant over time	SC Ms. Wilson Page 25	No	N/A	• APM agrees with Sierra Club / Ms. Wilson that these factors can change over time, degrading until maintenance is performed, then improving post-maintenance. The values provided by Big Rivers were estimated based on actual performance of the units + estimates of ongoing unit parameters after the unit retrofits were performed. As such, the estimates represent an average performance over time, not the "optimal" performance from which degradation would occur as suggested. These assumptions were consistent across all scenarios. • Further, Big Rivers included planned maintenance schedules for the entire 15 year modeled period for each unit. The average heat rate / forced outage rates were calculated to be consistent with the planned maintenance schedules. • Addressed in Rebuttal Testimony of Mr. Berry
15	Units modeled as a block instead of individually	SC Ms. Wilson Page 25	No	N/A	• CSAPR is designed as a cap-and-trade program, with allowances given based on generation facilities, but compliance measured system-wide. As such, it was necessary to evaluate all the units together to assess Big Rivers' compliance with CSAPR. • MATS compliance, however, is not measured system-wide. As such, each specific retrofit was designed to bring a plant into compliance. • In all instances, individual facilities/units were all modeled in the PaR model, with specific generation parameters assigned to each unit (Green 1 vs Green 2 for example).

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

OF

PATRICK N. AUGUSTINE
DIRECTOR
PACE GLOBAL, LLC

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
PATRICK AUGUSTINE

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

A. My name is Patrick Augustine. I am a Director for Pace Global, LLC ("Pace"), a Siemens business. My business address is 4401 Fair Lakes Court Fairfax, Virginia 22033.

Q. What is Pace?

A. Pace is an independent energy consulting and management firm with clients and engagements across the globe. Since 1976, Pace has provided services to support the execution of business strategies, complex energy transactions, asset development and operations in over 40 countries on six continents. Pace provides expertise in the following areas: corporate strategy, resource planning, M&A, asset development, acquisition and disposition, energy management, enterprise and commodity risk management, asset management, financial management, energy procurement, energy efficiency, and engineering services. Pace has worked regularly in the electricity and power market sector for 20 years, providing advisory support and modeling expertise to electric utilities, project developers, energy investors, and other financial institutions.

Q. Please describe your job responsibilities.

A. I am responsible for directing and overseeing the operations of Pace's power market analysis and advisory services and for the development and

maintenance of many of Pace's analytical capabilities in the power sector. As part of this responsibility, I regularly manage, execute, and oversee power market analysis exercises.

Q. Briefly describe your education and work experience.

A. At Pace, I specialize in market analysis and strategy development within the electric utility and power market sectors. Over the past six years, I have developed and operated power market dispatch systems and utility planning tools and have managed and performed power market assessments and risk-integrated resource planning analyses throughout North America and the world. My experience is focused on conducting power asset valuations and market assessments in order to support project developers, utilities, investors, and lenders in their project development, financing, and planning efforts. I have specific expertise and experience in developing modeling approaches and techniques to integrate cost, risk, and environmental objectives into resource planning efforts and power market analysis. I hold a Masters degree in Environmental Management from Duke University and a Bachelor's degree from Harvard University. A summary of my education and work experience is provided in the attached Exhibit Augustine Rebuttal-1.

Q. Did you submit direct testimony in this proceeding?

A. No, but I have sponsored several of Big Rivers' responses to requests for information in this matter.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Kentucky Industrial Utility Customers, Inc. ("KIUC") and in the testimony filed on behalf of Sierra Club.

Q. What was Pace's role in Big Rivers' consideration of its environmental compliance options in the development of Big Rivers' 2012 Environmental Compliance Plan.

A. Pace provided forecasts of energy market prices, natural gas prices, and allowance prices to Big Rivers. In developing the forecasts, Pace used a stochastic model that incorporates a range of market uncertainties and risks and produces a range of potential outcomes. Pace then developed an expected value for its forecasts. As part of this process, Pace performed 200 iterations of its model to develop its energy market price forecast. Pace then applied analyst interpretation and expert judgment to generate a reference case that was representative of the mean outcome of the distribution of the 200 iterations. The reference case for the energy price forecast provides expected values for hourly energy prices over the study period. The process included the development of 200 iterations of natural gas prices and 200 iterations of CO_2 allowance price projections, along with reference cases for each. It is my understanding that Big Rivers then had

ACES Power Marketing ("APM") use the reference case prices in certain of APM's production cost model runs.

Q. On page 20 of his testimony, Philip Hayet asserts that Big Rivers' analysis was flawed because Big Rivers used a Pace energy market price forecast that was "too high." Do you agree with Mr. Hayet that the Pace forecast was too high?

A. No. Mr. Hayet bases his assertion that Pace's prices were too high on nothing more than speculation and the fact that they were higher than two other forecasts (and mostly only in the later years of the forecasts). However, Pace's forecast was not too high. Pace's market prices incorporate a range of market uncertainties and risks. The point of doing a risk-based power market analysis is to incorporate as many market uncertainties as possible to observe the range of potential outcomes and develop an expected value. While Pace's projections may be higher than current single-point energy price forecasts that rely on natural gas prices staying below $5/MMBtu and no CO_2 price in the market, Pace believes there are several uncertainties that will be key drivers of power prices. All of our input distributions were filed in this case to allow the Commission and the intervenors to observe the range that was considered. The key drivers that influence our price projections are:

- Fuel prices and fuel price uncertainty – Although natural gas prices have come down in the eight months since the analysis was

performed, there are still significant uncertainties in these markets. While Pace acknowledges that our price distribution is currently lower than it was at the end of 2011, we still expect prices to move up to the $6-7/MMBtu (Real 2010$) by 2030.

- CO_2 price uncertainty – Pace uses a range of CO_2 prices that capture the probability of no prices and the probability of high prices. CO_2 prices impact marginal costs of production for power generators and hence contribute to rising power prices when they are included in the analysis.
- Market reserve margins – The level of reserve margin in any ISO market is a strong driver of power price. When reserve margins are tight, higher cost generation sets the market price. Under periods of high scarcity, market participants often offer prices above their marginal cost. Pace's analysis incorporates uncertainty in both key drivers of reserve margin: demand and supply. Our load growth uncertainty incorporates economic, weather, and behavior changes, while our dynamic build and retirement analysis changes the supply mix based on economic signals in the market. The assumption of a fixed, healthy reserve margin would not cover the range of potential outcomes.

Using the expected value incorporates risks to power market price changes, such as:

- Shocks to the natural gas price driven by regulatory events (such as hydraulic fracturing/fracking restrictions), technology change, weather events, demand changes, etc.
- Various environmental policy regulations
- Variation in the supply demand-balance that can lead to scarcity pricing events, such as hot summers, strong load growth, significant coal retirements, etc.

Additionally, as shown on the attached Exhibit Augustine Rebuttal-2, the market heat rates implied in Pace's price projections are reasonable and consistent with history for the region. The market heat rate is a measure of the relationship between power prices and natural gas prices and is generally expressed in the units of MMBtu/MWh. Over the next four to five years of the projection period, the market heat rate in the Pace prices used in the analysis is below 8 MMBtu/MWh. Over the longer term, there are two drivers for the observed increase in the market heat shown on that exhibit:

- CO_2 pricing introduced across many iterations
- Supply-demand balance tightening due to load growth and potential plant retirements. There is a chance for low reserve margins in the summer months, which drives up energy prices in certain iterations (the reason for the increased "peakiness" in the out years). These

market dynamics can be as important as fuel and emission price inputs.

Q. Please explain how Pace's energy market price forecast incorporated the range of CO_2 prices you mentioned above.

A. As explained above, Pace's modeling is designed to incorporate a range of market uncertainties and risks, produce a range of potential outcomes, and develop an expected value. Pace used that approach with regard to the potential impact of CO_2 regulation on energy prices. Because the outlook for comprehensive federal carbon regulation in the U.S. remains very uncertain at this time and because our philosophy in power market analysis is to incorporate uncertainties, Pace developed a series of potential CO_2 price outcomes for use in this analysis. These projections were based on fundamental analysis and our expert opinion of the likelihood of certain policy outcomes. Pace's distribution is based on a range of potential policy outcomes at the federal level (including the potential of no market price), with an internally consistent set of market feedbacks related to the demand and price responses in the natural gas and coal markets. Our market experts' review of potential policy regimes contributes to the development of low, mid, and high pricing cases, as well as a probability of no price at all over the next twenty years. Using Monte Carlo price propagation techniques in MATLAB, Pace projected a series of price paths around these cases.

Across our distribution (the 200 iterations), many iterations included no CO_2 price (approximately 20% of all iterations). Other iterations included low CO_2 prices. And still other iterations included high CO_2 prices, which encompass the range of CO_2 prices presented in Ms. Wilson's testimony. Across our range of outcomes, CO_2 is at or near zero in the expected value case until about 2016 and then ranges from $5/tonne in 2016 up to $35/tonne in 2030. (All values are in real 2010$.) The starting reference case and all 200 iterations used to develop the expected value analysis were provided in Big Rivers' responses to KIUC 1.18, SC 1.6 and 1.7, and AG 1-15 and 1-61.

Pace's CO_2 price projections are based on years of detailed tracking of all major climate change bills, the structure of regional cap & trade initiatives, and existing market based pollution control schemes established by EPA. In developing price projections, Pace starts with a reference case that projects a national carbon price to become effective by 2018. At this time, Pace expects emissions from large power generators and the emissions from petroleum products, at minimum, to be regulated. Pace expects the use of market-based mechanisms to ensure emissions reductions via cap & trade and / or some form of a carbon fee or tax. Similar to existing international CO_2 programs (*e.g.*, European Emissions Trading System) and U.S. regional programs (California AB 32 and the Northeast's Regional Greenhouse Gas Initiative), Pace expects a federal

U.S. program to have a declining cap (lower supply of allowances), which will place upward pressure on allowance prices as the program evolves.

Q. On page 24 of her testimony, Rachel Wilson asserts that Big Rivers' analysis was flawed because Big Rivers used a Pace energy market price forecast that was "inflated." Do you agree with Ms. Wilson that the Pace forecast was inflated?

A. No, and for the same reasons stated above. And my response to similar allegations from Dr. Steinhurst would also be the same.

Q. On page 21 of her testimony, Ms. Wilson asserts that the input natural gas price forecast from Pace's modeling is incorrect because it appears to be higher than other natural gas prices developed in 2011 and 2012? Do you agree with Ms. Wilson?

A. No. Although natural gas prices have declined since Pace performed its analysis at the end of 2011, it would not be appropriate to update only one element of Big Rivers' analysis without updating all other elements.

Moreover, although near term forward market prices have declined, Pace's fundamental outlook still expects rising prices over the long term. Near term (2012-2015) forward natural gas pricing was in the $4-6/MMBtu range in fall of 2011 when the analysis for this case was prepared. Near term pricing declined to the $3-4/MMBtu range in summer of 2012. The natural gas price projections that Pace would use if the analysis were to be conducted today reflect this decline in near term forward prices, as well as a

roughly $0.50/MMBtu decline over the long term. However, Pace's outlook still expects rising prices to the $6-7.50/MMBtu (real 2010$) range over the long term. Key drivers for why natural gas prices are expected to increase include:

- An industry shift to consolidation with more market-driven capital allocation decisions
- Declining production in the face of low prices, with "wet-gas" plays remaining economic only because of high oil prices
- Demand increases from the power sector (gas demand in the power sector is up 35% in 2012 from 2011)
- LNG exports over the longer term, with international markets currently trading at many times the price at Henry Hub

Q. On page 9 of his testimony, Dr. Steinhurst asserts that Big Rivers' evaluation of future scenarios does not include a reasonable projection of carbon prices. Ms. Wilson makes a similar assertion on pages 17 and 18 of her testimony. Do you agree with these assertions?

A. No. Pace has reviewed recent publically filed Integrated Resource Plans and other utility filings from 2011 and 2012 to assess the CO_2 prices currently used in the industry. They fall well within the band of outcomes used in our simulation as shown in Exhibit Augustine Rebuttal-3, and utilities are no longer using CO_2 pricing before 2015.

Q. In the testimony filed on behalf of Sierra Club, Ms. Wilson and Dr. Steinhurst assert that it would be less expensive for Big Rivers to retire all of its coal units and to replace them with new natural gas combined cycle units. Are there any flaws in Sierra Club's analysis?

A. Yes. The analysis does not fully incorporate certain risks associated with the market and with the cost and operational performance of the new combined cycle option. In addition to not incorporating the drivers of power price and fuel uncertainty described previously, the analysis treats the capital cost and operational efficiency of a new combined cycle build as static inputs to the analysis. The capital cost is approximately twenty percent lower than the middle expectation in Pace's distribution, and the analysis does not account for uncertainty in this estimate, especially in the face of increased demand for new equipment to replace retiring coal nationwide. The analysis also assumes a fully loaded heat rate for the replacement unit (6,800 Btu/kWh) that is likely far more efficient than average operations of similar technology (7,000 Btu/kWh – 7,400 Btu/kWh). A fair representation of the new plant's actual variable costs is important in assessing how it would perform in the MISO market. Finally, the CO_2 price used in the analysis is skewed to the high side of current expectations used throughout the industry, with Synapse's low case showing earlier and

higher pricing than much of Pace's distribution and many forecasts surveyed from utilities in the public domain.

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. The Commission should not reject Big Rivers' analysis based on KIUC and Sierra Club's faulty arguments about Pace's power market and natural gas price projections and baseless speculation that Pace's power price projections are too high. Pace's projections provide expected prices when incorporating a wide range of potential risks and uncertainties, such as the potential for regulations limiting CO_2 emissions. While higher than near term forward prices, Pace's projections are nevertheless reasonable when looking at drivers of longer-term prices.

Q. Does this conclude your rebuttal testimony?

A. Yes.

PACE GLOBAL

QUALIFICATIONS OF PATRICK AUGUSTINE

Summary of Qualifications

Mr. Augustine specializes in market analysis and strategy development within the electric utility and power market sectors. He is experienced with power market dispatch systems and utility planning tools and has managed and performed power market assessments and risk-integrated resource planning analyses throughout North America. He has experience in conducting power asset valuations and market assessments in order to support project developers, utilities, investors, and lenders in their project development, financing, and planning efforts. Mr. Augustine has specific expertise and experience in developing modeling approaches and techniques to integrate cost, risk, and environmental objectives into resource planning efforts and power market analysis.

Employment

Pace Global Energy Services LLC 2010 – Present
(Pace Global, LLC a Siemens Business)
Director

Responsible for directing and overseeing the operations of Pace Global's power market analysis and advisory services and for the development and maintenance of many of Pace Global's analytical capabilities in the power sector. Integrates key market drivers such as fuel prices, environmental compliance costs, demand projections, and regulatory outcomes into analyses that evaluate expectations for power market prices.

Pace Global Energy Services LLC
(Pace Global, LLC a Siemens Business)

Project Manager	(2009 - 2010)
Task Manager	(2008 - 2009)
Senior Analyst	(2007 - 2008)
Analyst	(2006 - 2007)

Education

Bachelor of Arts Degree in Environmental Science and Public Policy. Graduated Magna cum Laude, Harvard University, 2004

Master of Environmental Management Degree in Environment Economics and Policy, Certificate in Energy and Enironment, Duke University, 2006

Key Employment Projects

Resource Planning:

- *Midwestern Utility RIRP.* Performed detailed market forecasts and resource dispatch analysis in order to support a long-term RIRP for a Midwestern Utility. Analyzed the effects of uncertainty in various market drivers such as fuel prices, energy demand, environmental compliance costs, contract

parameters, capital costs, and environmental retrofit costs in order to develop risk profiles and comparative portfolio analyses.

- *Midwestern Utility Resource and Strategic Planning Advisory.*
  - Managed a multi-tiered effort to support a coal-dominant Midwestern electric utility in evaluating retrofit economics for a major coal plant in their fleet and assessing the opportunities to develop natural gas-fired generation. Incorporated risk-integrated tools to assess strategic decisions in both scenario and stochastic-based approaches.
  - Managed an uncertainty-based portfolio analysis to assess the costs and risks associated with various natural gas-fired technology, sizing, and timing options for new development.

- *California Utility RIRP and Stakeholder Process.* Performed RIRP analysis for a California utility in order to evaluate various supply side and demand side options in the context of cost, risk, and environmental stewardship metrics. Managed an effort to screen resource and technology options, coordinated the development of analytical tools used to simulate the utility's service territory and operations, and led portfolio analysis around a range of uncertainties around fuel prices, demand, capital costs, resource availability, coal plant performance, and environmental compliance costs.

- *Texas Utility RIRP and Stakeholder Process.* Managed an effort to perform an RIRP analysis for a Texas utility in order to evaluate potential resource plans in the context of several cost, rate, and environmental objectives. Developed assumptions around key market drivers and financing parameters and conducted screening analysis to simulate the hourly operations of the utility's system. Analyzed technology choices and associated costs, revenue requirements, and environmental metrics for distinct portfolio concepts. Expanded the analysis to introduce risk and uncertainty for select portfolio options around natural gas prices, power market prices, energy demand, carbon compliance costs, and transmission expansion.

Uncertaintity Analysist to Support Project Development, Sale, or Purchase:

- *National Risk-Integrated Project Development Screen.* Managed a national assessment to screen potential regions across the United States for development of new combined cycle or natural gas peaking capacity. Provided oversight for stochastic assessments in NYISO, PJM, ISO-NE, MISO, and CAISO markets. Analyzed development potential in utility-centric regions in the Southeast, Midwest, and West.

- *California Pumped Storage Valuation.* Managed an effort to value a pumped storage hydro project in California under a stochastic range of fundamental and market-driven variables. Performed fundamentals-based analysis of the California market and assessed hourly optimization techniques and price volatility to evaluate energy, ancillary services, and capacity value.

- *Sell-Side Stochastic Valuation Support for a Northeast Power Portfolio.* Managed a stochastic-based power market assessment of nine mid-merit and peaking natural gas-fired power generating assets throughout PJM, ISO-NE, and NYISO to support a sell-side transaction.

- *Buy-Side Stochastic Valuation Support for a CAISO Peaker Portfolio.* Supported a stochastic-based power market assessment to evaluate the performance of two peaking natural gas-fired power Actively developing Pace Global's Power and Renewable Market Advisory offering to developer and

Power Market Dispatch and Price Projection Analysis:

- *Multi-Region Domestic and International Power Market Assessment.* Managed the development of power market assessments and plant revenue projections for a portfolio of over 20 assets across eight distinct market areas in the United States and Europe. Conducted contract review and competitive market simulations to support the financing of the portfolio and supported the analysis for

the client, lenders, and rating agencies. Performed regional power market analysis in ISO-NE, PJM, Entergy, SPP, MISO, CAISO, and Nevada.

- *Analysis of Pricing Premiums in Hourly Dispatch Modeling.* Developed methodology and carried out modeling enhancements that internalize bidding and scarcity premiums into hourly price forecasts. Developed integrated forecasts of the New York market area in accordance with historically observed relationships between hourly reserve margins and market clearing prices.
- *Power Market Assessments of the New York ISO Market.*
    - Managed the development of a power market assessment report and energy and capacity pricing forecast of the New York Control Area ("NYCA") Zone D power market in order to support wind project development. Enhanced annual load shape modeling for the upstate New York region and provided energy and capacity price forecasts under a base case scenario and under scenarios with high and low natural gas price projections.
    - Managed the development of a power market and financial analysis for a transmission developer assessing the NYISO Zone J and PJM East market areas. Assisted in an analysis of the probability of an emergency curtailment event in the PJM ISO in order to assess risks to the project.

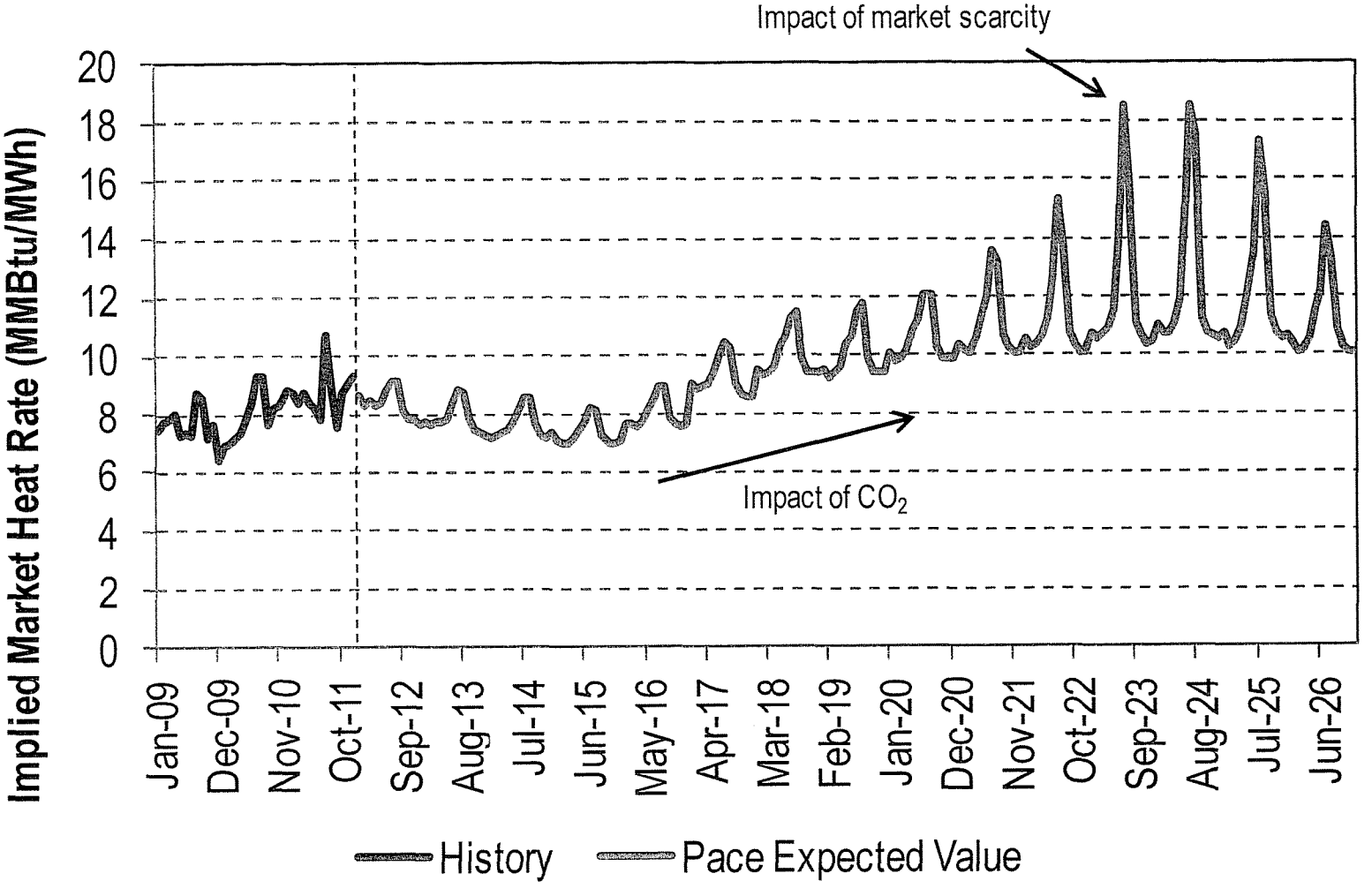
Environmental Market Analysis:

- *SO_2, NO_x, and Hg Allowance Price Forecasting.* Assisted in the development of market and regulatory assumptions for a power market model that forecasts emission credit prices and plant-level environmental compliance strategies.
- *Policy Analysis and Emission Allowance Price Forecasting for CO_2 and other Pollutants.* Assisted in the development of market and regulatory assumptions for a power model analysis of a specific federal four-pollutant policy proposal. Developed assumptions on feasible nuclear and renewable capacity additions in a carbon-constrained environment, established cost and heat rate assumptions for IGCC with carbon sequestration technologies, and created a model to adjust long-run electricity demand forecasts according to assumptions regarding price elasticity under a higher cost carbon regime. Analyzed resulting capacity expansion plan and emission allowance price projections under base case and policy case scenarios.

Countries of Experience

Australia, Canada, Colombia, Guatemala, Ireland, Ukraine, United Kingdom, United States

Big Rivers Electric Corporation
Case No. 2012-00063



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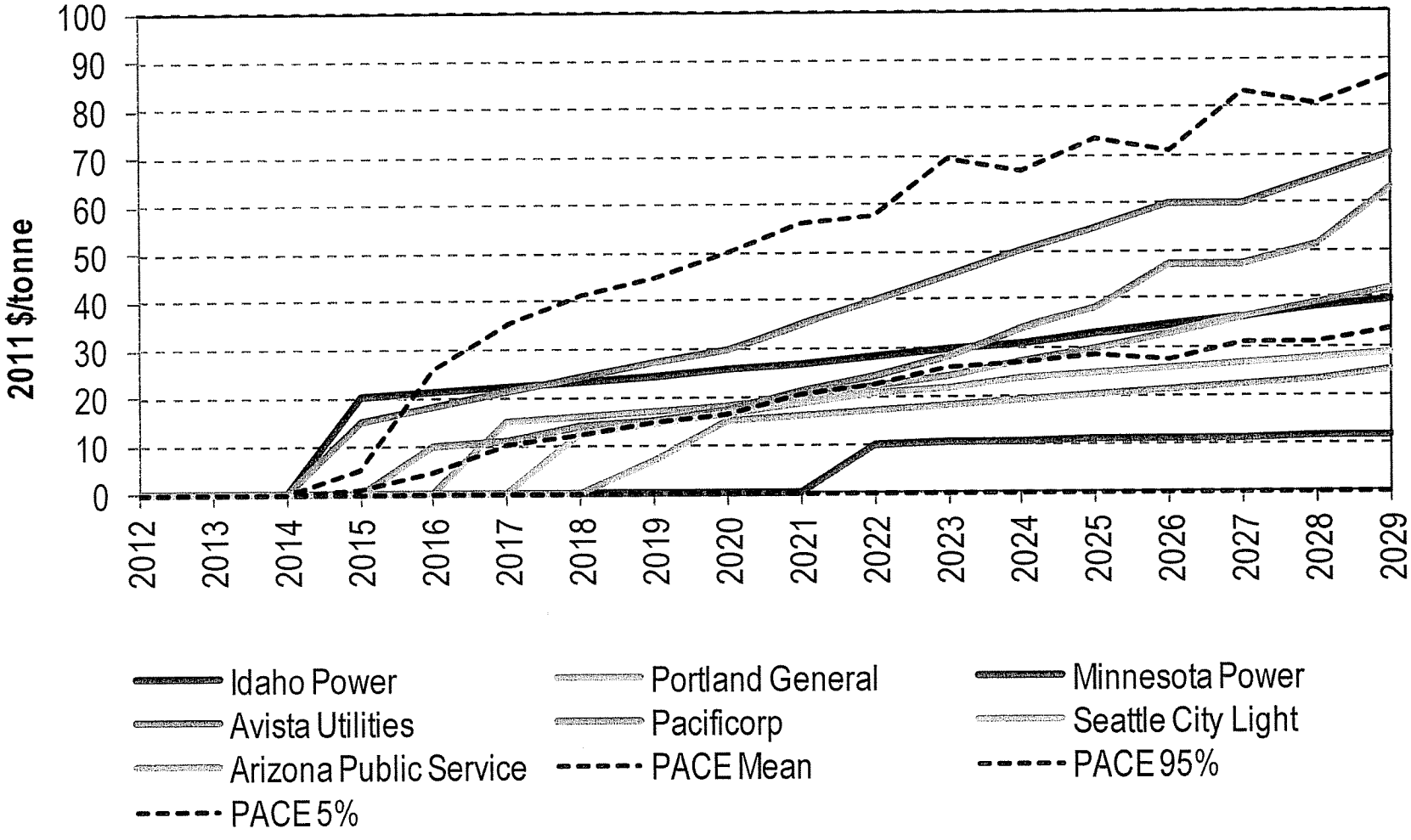
PACE CO2 PRICE PROJECTIONS VS. CO2 PRICE PROJECTIONS FROM RECENT PUBLICALLY FILED INTEGRATED RESOURCE PLANS AND OTHER UTILITY FILINGS FROM 2011 AND 2012



COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

THE APPLICATION OF BIG RIVERS ELECTRIC CORPORATION FOR APPROVAL OF ITS 2012 ENVIRONMENTAL COMPLIANCE PLAN AND REVISIONS TO ITS ENVIRONMENTAL SURCHARGE TARIFF, FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY, AND FOR AUTHORITY TO ESTABLISH A REGULATORY ACCOUNT	))))))))	Case No. 2012-00063

REBUTTAL TESTIMONY

OF

WILLIAM DePRIEST
PRESIDENT AND DIRECTOR, DePRIEST CONSULTING, INC.

ON BEHALF OF

BIG RIVERS ELECTRIC CORPORATION

FILED: August 14, 2012

REBUTTAL TESTIMONY
OF
WILLIAM DePRIEST

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

A. My name is William DePriest. I am President and Director of DePriest Consulting, Inc., 312 North East Avenue, Oak Park, Illinois 60302.

Q. Did you submit direct testimony in this proceeding?

A. Yes.

Q. What is the purpose of this rebuttal testimony?

A. The purpose of my rebuttal testimony is to address certain of the alleged errors that are asserted in the testimony filed on behalf of Sierra Club.

Q. On page 13 of her testimony, Rachel Wilson indicates that additional stack testing may reveal the need for Big Rives to upgrade its existing electro static precipitators ("ESPs") and do polishing baghouse (and full baghouse technologies, if necessary) retrofits. How likely is it that Big Rivers will have to upgrade its existing ESPs or do baghouse retrofits?

A. Sargent & Lundy advised Big Rivers that, although confirmation through testing would be prudent, the ESPs in the Big Rivers system coupled with the existing FGD systems would be suitable for maintaining the filterable particulate matter below 0.03 lbs/mmBtu while using activated carbon injection for mercury control as required by the MATS rule. Sargent & Lundy has managed similar testing at other similarly sized coal units for

other utilities where this has been borne out. We are confident that the Big Rivers units also have this capability, although we will typically advise that testing would be a prudent measure to avoid unforeseen issues that might disrupt the scheduled operation of the units.

Q. What are your conclusions and recommendations to the Commission in this proceeding?

A. Based on Sargent & Lindy's experience and testing with activated carbon injection for mercury emission control on ESPs on coal plants similar to the Big Rivers plants, I conclude that the Big Rivers facilities will perform at the level needed to comply with the MATS rule while using activated carbon injection for mercury emission control. Therefore, Big Rivers need not include funds in its environmental plan for replacement of the existing ESPs with fabric filters.

Q. Does this conclude your rebuttal testimony?

A. Yes.