

***Kentucky Public Service Commission***

***Staff Report On the  
2002 Integrated Resource Plan Report  
of Big Rivers Electric Corporation***

***Case No. 2002-00428***

***March 2004***

## **SECTION 1**

### **INTRODUCTION**

Administrative Regulation 807 KAR 5:058, promulgated in 1990 by the Kentucky Public Service Commission, (“Commission”) established an integrated resource planning (“IRP”) process that provides for regular review by the Commission Staff of the long-range resource plans of the six major electric utilities under its jurisdiction. The goal of the Commission in establishing the IRP process was to ensure that all reasonable options for the future supply of electricity were being examined and pursued and that ratepayers were being provided a reliable supply of electricity at the lowest possible cost.

On November 27, 2002, Big Rivers Electric Corporation (“Big Rivers”) filed its 2002 IRP with the Commission. The IRP report submitted by Big Rivers was prepared by GDS Associates, Inc. and it included Big Rivers’ plans for meeting the electricity requirements of the customers of its member cooperatives for the 2002-2017 period.

Big Rivers is a generation and transmission cooperative headquartered in Henderson, Kentucky. It provides all of the power requirements of Jackson Purchase Energy Corporation, Kenergy Corporation, and Meade County Rural Electric Cooperative Corporation, with the exception of 2 aluminum smelters served by Kenergy. The 3 distribution cooperatives, which provide service in 22 counties located in western Kentucky, primarily serve residential customers, which account for roughly 90 percent of the total 103,000 customers they served in 2002.

Since 1998, Big Rivers has not operated the generating units it owns. Big Rivers leases those units to a non-regulated subsidiary of LG&E Energy Corp. and purchases a portion of the capacity and energy of its units through an arrangement with another subsidiary of LG&E Energy Corp., LG&E Energy Marketing, Inc. (“LEM”). Under this arrangement, Big Rivers no longer provides wholesale power for Kenergy’s retail sales to the aluminum smelters, Alcan and Century Aluminum; however, it continues to provide transmission service for the smelters. In addition to purchasing from LEM, Big Rivers also purchases power from the Southeastern Power Administration (“SEPA”).

The purpose of this report is to review and evaluate the IRP in accordance with the requirements of 807 KAR 5:058, Section 12(3), which requires the Commission Staff to issue a report summarizing its review of each IRP filing made with the Commission and make suggestions and recommendations to be considered in future IRP filings. The Staff recognizes that resource planning is a dynamic ongoing process. Thus, this review is designed to offer suggestions and recommendations to Big Rivers on how to improve its resource plan in the future. Specifically, the Staff’s goals are to ensure that:

- All resource options are adequately and fairly evaluated;
- Critical data, assumptions and methodologies for all aspects of the plan are adequately documented and are reasonable; and

- The selected plan represents the least-cost, least risk plan for the ultimate customers served by Big Rivers and its member cooperatives.

The report also includes an incremental component, noting any significant changes from Big Rivers' most recent IRP filed in 1999.

Based on forecasted average annual growth rates of 1.0% for peak demand and 0.7% for energy, Big Rivers projects that it will require no additional supply resources over the 2002-2017 forecast period. This reflects a capacity surplus throughout the planning period based on Big Rivers' power purchase arrangements with LEM and SEPA. This ongoing capacity surplus is due in part to the addition of 50 megawatts ("MW") of cogeneration capacity by one of its industrial customers in June 2001.

The remainder of this report is organized as follows:

- Section 2, Load Forecasting, reviews Big Rivers' projected load growth and load forecasting methodology.
- Section 3, Demand-Side Management, summarizes Big Rivers' evaluation of demand side management ("DSM") opportunities.
- Section 4, Supply-Side Resource Assessment, focuses on Big Rivers' evaluation of supply resources options to meet future load requirements.
- Section 5, Integration and Plan Optimization, discusses Big Rivers' overall assessment of supply-side and demand-side options and their integration into an overall resource plan.

## SECTION 2

### LOAD FORECASTING

#### Introduction

This section summarizes the methodology and results of Big Rivers' load forecast, describes changes that have occurred since its last IRP and discusses the reasonableness of its current approach. The load forecast was prepared in 2001 to comply with the Rural Utilities Service's ("RUS") requirement that Big Rivers prepare forecasts on a biennial basis. The forecast was developed by Big Rivers and GDS Associates, Inc. Big Rivers, which is headquartered in Henderson, Kentucky, provides wholesale power to three member distribution cooperatives: Kenergy Corporation, Jackson Purchase Energy Corporation, and Meade County Rural Electric Cooperative Corporation who provide retail electric service to consumers in 22 western Kentucky counties. Approximately 90% of the cooperatives' customers are residential; however, because of Big Rivers' large industrial load, residential customers account for only 40% of Big Rivers' energy sales.

#### Methodology

The purpose of both its long term and short term load forecasts is to provide Big Rivers with reliable load projections, which are essential components of its resource, transmission and financial planning functions. Developing reliable load forecasts is one of the first steps Big Rivers must take in order to continue to provide adequate and reliable service at the lowest reasonable cost.

It is accepted that energy sales track economic activity generally. However, national economic conditions do not always reflect economic conditions at the local level. Therefore, Big Rivers' load forecasts were developed based on a "bottoms-up" approach. The essence of this type of approach is the realization that the customer classes within and between the member cooperatives and the 22 counties in which they operate are not all the same and that local economic conditions are important factors in forecasting energy consumption. County level economic and demographic data were collected for each of the 22 counties in which Big Rivers' member cooperatives provide service. Since the cooperatives serve only portions of some counties, the number of residential households and the number of residential customers located within each county were used to develop county weighting factors, which then represented each cooperative's market share of each county served.

Energy sales projections were developed at the customer class level for each cooperative and aggregated to provide system projections. The cooperatives' customer classes include Residential, Small Commercial, Large Commercial, and Public, Street, and Highway Lighting classes. Big Rivers also has several large direct serve industrial customers. Projections of peak demand were developed for the rural system, total native system, and total native system plus direct serve customers. Historical data used by Big Rivers covers 1981 – 2000. The forecast period covers the years 2001 – 2015.

The data necessary to develop each of the forecast scenarios comes from a variety of sources. Historical system data including the number of customers, energy sales revenue by customer class, system energy requirements, power costs and peak demand were obtained from RUS Form 7 databases. Bureau of Labor Statistics databases provided historical price and personal consumption information. Woods & Poole Economics, Inc. provided historical and forecasted economic and demographic data including personal income, retail sales, sector earnings levels, population, households and employment. Additional historical and forecasted economic and demographic data were obtained from the University of Louisville and NPA Data Services, Inc. Historical and forecasted natural gas prices came from the Gas Research Institute and the Energy Information Administration. The National Oceanic and Atmospheric Administration provided historical monthly heating and cooling degree days and temperature extremes data for both the Evansville, Indiana and the Paducah, Kentucky areas.

### Short Term Forecast

Big Rivers' short-term forecast contains monthly projections of energy sales and demand for the years 2001 – 2005. Sales projections include projections by customer class, rural system sales, rural system Non-Coincident Peak ("NCP") demand, total system sales, and total system NCP demand.

Big Rivers' load forecast was developed using standard forecasting methods including econometric models, exponential smoothing, historical trends and informed judgement. The number of consumers and energy sales were projected at the customer class level and aggregated for the total system forecast. Econometric models were used to project energy sales for the residential and small commercial customer classes for each of the three member cooperatives. The energy models quantify relationships between monthly energy consumption, per capita income, electricity prices, retail sales, and heating and cooling degree days. The consumer models quantify relationships between consumer growth, employment, and population. Energy sales and the number of customers for all other classes were developed using trend models.

Large commercial sales were developed individually for each consumer by the member cooperatives' management based on historical trends and information provided by individual consumers. Public street lighting projections were based on historical trends. Rural system energy sales were computed as total system sales minus sales to direct serve customers, all of which are large commercial / industrial sales customers. The forecast of rural system NCP demand is the sum of the individual member cooperative's projections of rural system coincident demand, which were based on econometric models. Projections of non-rural peak demand (direct serve customers) were made by individual member cooperative staff based upon historical trends and customer supplied information. Total system energy requirements were forecast using an average line loss factor applied to projected total system energy sales.

## Long Term Forecast

Big Rivers' long-term forecast methodology is very similar to that used to make its short-term projections. Econometric models were developed to forecast total system coincident peak demand by the member cooperatives on a summer (May-October) and winter (November-April) seasonal basis. Econometric models were used to make projections of energy sales for the residential class, as well as commercial energy sales and rural system coincident peak demand. Large commercial demand and energy projections were developed using information provided by Big Rivers' member cooperatives regarding local industrial operations. Energy sales for all other classifications were developed using linear trends. Finally, projections of direct serve peak demand were developed by member cooperatives and based on informed judgement. Total system NCP projections are the sum of individual rural system NCP and direct serve NCP projections.

At the time Big Rivers' load forecast was being prepared, the Kentucky General Assembly had not enacted any legislation to deregulate Kentucky's electric industry. Therefore, Big Rivers' forecasts do not include any explicit effects associated with electric industry restructuring.

## Results

Big Rivers' short-term (2001-2005) forecast results indicate that total native system energy requirements will decline by an annual average rate of 0.9%. Total native Coincident Peak ("CP") will also decline by an annual average rate of 0.3%. However, rural system energy requirements are projected to grow at an annual average rate of 2.8% and rural system NCP demand is projected to grow at an annual average rate of 2.4%. The primary drivers behind the declines are the projected decrease in large commercial energy sales and consumers. This is primarily the result of the loss of load due to the installation cogeneration facilities by the large commercial / industrial customer class. This customer class represents just over 46% of Big Rivers' total system energy sales. One industrial customer has already reduced its load by 50 MW as a result of installing cogeneration facilities. Residential and small commercial energy sales are projected to grow at an annual average rate of 2.9% and 2.5%, respectively.

For Big Rivers' long term forecast, the total native system energy requirements and CP demand for generation service are projected to grow at average compound rates of 0.7% and 1.0%, respectively, for the period 2001-2015. The residential class accounts for about 90% of all customer accounts. Long-term residential sales are projected to increase at an average annual rate of 2.5%. The small commercial and industrial class is relatively small and accounted for about 15% of total system energy sales in 2000. The long-term forecast for energy sales for the small commercial and industrial class is projected to increase at an average annual rate of 2.3%. Total rural system energy requirements and rural system NCP demand are projected to grow at average rates of 2.4% and 2.3%, respectively, for the forecast period. Rural system energy and peak demand requirements are total native system requirements less those associated with direct-serve customers. The primary influence on growth in system

requirements continues to be growth in residential sales, which is primarily a function in growth in the number of customers.

Table 6.3 of Big Rivers' Load Forecast study provides a comparison of its 1999 and 2001 load forecasts. There is a significant difference between the two projections. For the 2001 forecast, both total native energy requirements and CP demand are smaller than that projected in 1999. The 1999 forecast projected total native energy requirements of 5,253,381 megawatt hours ("MWh") and a CP of 984 MW by 2015. In contrast, the 2001 forecast projected a total native energy requirement of 4,002,583 MWh and a CP of 790 MW. The differences are due to the short-term loss of large commercial customer load and to realized population growth being smaller than the 1999 projections. In the 2001 forecast, total native energy requirements (MWh) were projected to decline through 2002 and then begin to recover. Energy requirements are not forecast to surpass the 2000 level of 3,596,398 MWh until 2009.

### Uncertainty Analysis

An uncertainty analysis was performed to examine the impact of varying conditions upon Big Rivers' rural load growth. A base case forecast was developed using the expected economic outlook and normal weather conditions. Then, four additional forecast scenarios were developed: base case economic conditions with mild weather, base case economics with extreme weather, optimistic economic conditions with normal weather, and pessimistic economic conditions with normal weather. For the weather variations, only the residential class and the small commercial and industrial class were deemed to be weather sensitive. Thus, as to be expected, the weather variations produced relatively small variations in total system energy requirements. The extreme and mild weather scenarios accelerated or moderated the long-term annual average growth rate by only 0.1%. Changes in economic conditions had a much larger effect on the long-term forecasts. Changes in economic activity affect the number of customers (growth), as well as levels of commercial activity, which directly impacts the overall demand for electricity. The optimistic economic scenario increased total system energy requirements average annual growth rate from 0.7% to 1.2%. The pessimistic economic scenario decreased the average annual growth rate to 0.2%.

### Discussion of Reasonableness

In its April 2001 Staff report on Big Rivers' 1999 IRP, Staff made the following recommendations for Big Rivers' consideration in preparing its next IRP filing:

- Provide a comparison of forecasted winter and summer peak demands with actual results for the period following Big Rivers' 1999 IRP, along with a discussion of the reasons for the differences between forecasted and actual peak demands.
- Provide a comparison of the annual forecast of energy sales with actual results for the period following the 1999 IRP. Include a discussion of the reasons for the differences between forecasted and actual results.

- Big Rivers should, to the extent possible, report on and reflect in its forecasts the impacts of increasing wholesale and retail competition in the electric industry.
- Big Rivers should attempt, either in its forecasts or in its uncertainty analysis, to incorporate the impacts of environmental costs such as those associated with nitrogen oxide ("Nox") reductions imposed on sources in the Eastern United States.

Staff is generally satisfied that Big Rivers has addressed its recommendations. We do note, however, that Big Rivers did not attempt to incorporate into either its forecasts or its uncertainty analysis any environmental cost impacts associated with Nox reductions. Big Rivers stated that, at the time its load forecast was developed, it assumed the impacts of new environmental regulations on power costs and retail rates to be insignificant. Therefore, the projections contained in its forecast do not include any environmental impacts.

In its response to the first recommendation, Big Rivers indicated that it had made a change to project long-term peak demand on a summer / winter basis, rather than continue to project it only on an annual basis. It also indicated that, other than the load reduction experienced due to the addition of the Willamette / Weyerhaeuser cogeneration facility, the primary reason for actual demands not reaching forecasted demands was that projected growth in the industrial class did not materialize. The same explanation also applied to why actual energy sales did not reach the levels that were forecast as part of Big Rivers' 1999 IRP.

### Recommendations

Given the manner in which Big Rivers responded to the Staff's recommendations contained in its report on Big Rivers' 1999 IRP and the changes reported by Big Rivers, and discussed in the previous paragraph, Staff concludes that all that is necessary is to repeat its previous recommendations. Therefore, we recommend that Big Rivers should include consideration of the following items in preparing its next IRP filing:

- Provide a comparison of forecasted winter and summer peak demands with actual results for the period following Big Rivers' 2002 IRP, along with a discussion of the reasons for the differences between forecasted and actual peak demands.
- Provide a comparison of the annual forecast of energy sales with actual results for the period following the 2002 IRP. Include a discussion of the reasons for the differences between forecasted and actual results.
- Big Rivers should, to the extent possible, report on and reflect in its forecasts the impacts of increasing wholesale and retail competition in the electric industry.
- Big Rivers should attempt, either in its forecasts or in its uncertainty analysis, to incorporate the impacts of environmental costs such as those associated with NOx reductions imposed on sources in the Eastern United States.

## SECTION 3

### DEMAND SIDE MANAGEMENT

#### Introduction

This section summarizes the issues presented in Big Rivers' DSM plan included in its 2002 IRP. Big Rivers stated that its plan is designed to help its members save energy and money, to provide up-to-date information to members about energy efficiency options, and to take advantage of the environmental and other benefits of energy efficiency programs so that consumers can make informed decisions.<sup>1</sup>

#### Response to Staff's Report on the 1999 IRP

In its IRP, Big Rivers addresses issues raised by the Staff and intervenors in its previous IRP case.<sup>2</sup> In that case, Staff recommended that Big Rivers report on its efforts to evaluate Local Integrated Resource Planning ("LIRP"), co-generation and distributed generation, and other initiatives of the type advocated by the Kentucky Department of Energy ("KDOE") and the Office of the Attorney General ("AG"). Big Rivers states that it has taken positive steps toward LIRP planning with the 85 MW cogeneration unit brought on line in 2001 by an industrial customer. Big Rivers also reports that it is in the preliminary stages of determining the feasibility of making a capital investment at this site, which would potentially provide for an additional 20-30 MW of generation.

Another DSM issue addressed in the previous IRP is net metering. Big Rivers reviewed all existing net metering tariffs on file with the Commission, in particular the 36-month pilot programs of Louisville Gas and Electric Company ("LG&E") and Kentucky Utilities Company ("KU").<sup>3</sup> Big Rivers stated that it plans to present its recommendation on net metering programs to its Board of Directors after LG&E's and KU's pilot programs are completed and the Commission issues a final ruling thereon.

Big Rivers also addressed Staff's recommendation to establish a constructive dialogue between KDOE and the AG in developing its DSM proposal for this IRP. Big Rivers reports that its representatives met with KDOE in April 2002 to discuss KDOE input. Big Rivers states that a representative of the AG's office reviewed and provided

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<sup>1</sup> Integrated Resource Plan, Appendix B, page 99.

<sup>2</sup> Case No. 1999-00429, the Filing by Big Rivers Electric Corporation of Its 1999 Integrated Resource Plan, Order dated April 12, 2001.

<sup>3</sup> Case Nos. 2001-00303 and 2001-00304 The Tariff Filing of Louisville Gas and Electric Company and Kentucky Utilities Company to Add Pilot Net Metering Electric Service, Order dated March 14, 2002.

constructive comments on the draft 2002 IRP. Big Rivers also completed a new DSM study in November 2002, as recommended in the previous case. Big Rivers states that the study expands significantly beyond the analysis of the 1995 DSM study. The results of the 2002 DSM study were used to prepare a three-year action plan regarding energy efficiency measures.

In addition to responding to these issues from Staff's report on its 1999 IRP, Big Rivers' IRP indicated that it was evaluating a possible purchase of renewable resource power ("Green Power") from two neighboring utilities, East Kentucky Power Cooperative and Wabash Valley Power Association. In a data response, Big Rivers also indicated that it was developing an incentive program for homes and business that need high efficiency heating systems. Such a program, according to the data response, would be designed to increase the efficiency of Big Rivers by increasing its system load factor.

### Screen Process and Results

The DSM study was performed for Big Rivers by GDS Associates using a list of potential demand-side resource options developed from GDS's own library, as well as options identified by other state and federal agencies, research organizations and Big Rivers' previous IRPs. GDS developed the following seven task areas as part of its process to assess the DSM options:

- Task 1: Preview draft work plan for DSM and the proposed methodology
- Task 2: Select benefit/cost model
- Task 3: Collect Input Data on a Broad Range of DSM Option
- Task 4: Develop general assumptions
- Task 5: Input data into the model for preliminary economic screening
- Task 6: Run the screening model for individual DSM options
- Task 7: Prepare report with action plan

GDS reviewed 25 residential DSM options and 45 commercial DSM options, employing the Total Resource Cost Test ("TRC") to screen the economic feasibility of each of the options. Application of the TRC results in 13 residential and 12 commercial programs that have a benefit to cost ratio greater than one. The residential measures involved mainly lighting programs, nine involving combinations of wattage and usage hours for compact fluorescent lights. The commercial measures contained programs for more efficient lighting and machinery.

### Comments of the Attorney General

The AG provided several comments on Big Rivers' DSM efforts. His comments were generally favorable, although he disagrees with Big Rivers' plan to review the results of the LG&E and KU net metering programs before proceeding with its own program. The AG encourages Big Rivers to move forward with a net metering program rather than wait until the LG&E and KU pilot programs are complete. The AG cited LG&E's and KU's not informing customers about their net metering programs as the reason why few customers are likely to participate. The AG expects current benefits for Big Rivers' distribution cooperatives if they participate in net metering. He suggested a

pilot program with a limit on the number of participants in order to minimize possible liability for Big Rivers until it becomes comfortable with net metering. The AG believes a net metering program would encourage the development of small-scale renewable energy projects and provide good will and publicity for Big Rivers at little cost.

In its reply comments, Big Rivers responded to comments on its plans for net metering by stating that it continues to believe that it is more prudent to wait until LG&E and KU complete their pilot net metering programs before proceeding with its own program. Big Rivers argues that its approach is driven by lack of demand in its service areas and the possible detrimental impacts of net metering. Examples of such impacts are the safety issues associated with allowing a meter to spin backwards and the costs to insure the safety of an electric system that utilizes net metering.

### Comments of the Kentucky Division of Energy

KDOE also commented on Big Rivers' plan to postpone a net metering program until LG&E's and KU's pilot programs are complete. KDOE shares the AG's concern that the absence of publicity by LG&E/KU will hold down the number of participants in their programs. Big Rivers' response to KDOE and the AG's position on net metering programs were addressed in the preceding section.

KDOE commented extensively on Big Rivers' DSM study performed by GDS. KDOE expressed disappointment in its limited input into the development of the DSM study, which in its view, resulted in duplicate programs being included therein. KDOE also disagreed with the use of zero as the cost for avoided capacity, since, it argues, any excess capacity could be sold in the wholesale market for a profit. KDOE believes that the use of a value greater than zero could have a significant effect on Big Rivers' and GDS's quantitative analysis of DSM options. KDOE reiterated that it was not recommending that Big Rivers implement DSM programs for the sole purpose of becoming an energy marketer or freeing up capacity to sell power in wholesale markets. It emphasized that any energy sales would only be a side effect of the DSM programs.

In its reply comments, Big Rivers addressed the extent to which it had included KDOE in its IRP and DSM planning. Big Rivers stated that it had visited KDOE and that its consultant, GDS Associates, contacted KDOE approximately twelve times to obtain information for the DSM analysis. It states that it will continue to attempt to include KDOE in its DSM planning. Big Rivers states that it continues to believe that zero is the appropriate value for the avoided cost of capacity in analyzing DSM measures. It argues that its current power contracts do not include discrete demand costs, therefore, it would not realize a decrease in demand costs with a decrease in MWh purchased. The reduced purchases would, however, decrease the cost of purchased power, which was already factored into the DSM analysis. Big Rivers agrees with KDOE that it should not implement DSM programs for the sole purpose of energy marketing.

KDOE also discussed its criticism of Big Rivers' previous IRP, criticism which concerned the fact that the DSM plan placed little or no emphasis on new buildings and manufacturing processes. KDOE believes this criticism is still valid in light of the programs examined in the GDS study. Big Rivers responded that energy efficient new

homes, new commercial building design and combined heat and power were programs it did not analyze. Big Rivers also argued that programs such as the Energy Star new home program would not be cost effective given its own cost structure. Big Rivers concluded that other programs not specifically addressed in the DSM study would be non-beneficial due to the low cost of wholesale power under Big Rivers' power purchase agreement with LG&E Energy Marketing.

### Discussion of Reasonableness

Staff is generally encouraged with Big Rivers' progress in the area of DSM. However, Staff does not believe it is reasonable for Big Rivers to delay implementing a net metering pilot program until LG&E and KU complete their pilot programs. Big Rivers indicated in its response to a data request that it was conducting a study which included net metering, which would be filed with the Commission in the fall of 2003. Big Rivers has not yet filed such a study.

Some of KDOE's comments on Big Rivers's DSM plan focus on similar themes – i.e., the plan's concentration on individual technologies rather than a broader view of areas such as new housing construction and improved manufacturing processes. While it does not necessarily believe that Big Rivers, or any utility, can have a significant impact on the housing industry, Staff does believe that Big Rivers' future IRPs should evaluate DSM programs that provide increased efficiency for all customers, not just residential and commercial customers. Therefore, Staff believes that Big Rivers should include an evaluation of programs related to improved manufacturing processes in its next IRP. Staff looks forward to seeing an expansion of the type and variety of potential DSM programs evaluated in Big Rivers' future IRPs.

Big Rivers argues that its market sales are typically short-term and do not provide any certainty that it will make similar sales in the future. Big Rivers questions the viability of any DSM measure that depends on the wholesale price of electricity. KDOE and Big Rivers are in agreement that Big Rivers should not implement a DSM program for the sole purpose of energy marketing. Staff agrees with Big Rivers' position that the IRP process, as defined by 807 KAR 5:058, focuses on meeting future demand within Big Rivers' service area, as opposed to the expansive view offered by KDOE, which includes wholesale sales off-system.

Given the results of Big Rivers' demand and energy forecast and considering its wholesale supply arrangements, Staff concludes that Big Rivers' use of zero as the cost of avoided capacity is reasonable. While Staff does not disagree with KDOE that using a value greater than zero could have an effect on Big Rivers' and GDS's analysis of DSM options, it does not agree with KDOE that Big Rivers must use a value greater than zero, given that it forecasts no capacity needs over its entire planning horizon.

### Recommendations

Staff agrees with the AG and KDOE in their arguments for proceeding with a net metering program before the LG&E and KU pilots are complete. Big Rivers stated in its response to a data request that it planned to conduct a study, which would include net

metering. The study was expected to be available by the fall of 2003. Staff looks forward to receiving the Big Rivers study, hopefully in the near future.

Big Rivers' future IRPs should evaluate DSM programs that provide increased efficiency for all customers, not just residential and commercial customers. Big Rivers should include an evaluation of programs related to improved manufacturing processes in its next IRP.

Big Rivers had indicated that it would make a filing with the Commission by the end of 2003 for approval to include a Green Power project in its renewable energy portfolio. To date, such a filing has not been received. Big Rivers should communicate with Staff on the status of this filing and indicate whether it expects to make such a filing sometime in 2004. Staff looks forward to receiving Big Rivers' communication and reviewing its Green Power filing, hopefully in the near future.

Big Rivers had indicated that it expected to have completed the design of its high efficiency heating incentive program in mid 2003 and that it would seek Commission approval after its Board of Directors approved the program. Staff recommends that Big Rivers inform Staff of the status of this program and explain whether it anticipates filing for such approval in 2004.

## SECTION 4

### SUPPLY-SIDE RESOURCE ASSESSMENT

#### Introduction

This section summarizes and reviews Big Rivers' evaluation of supply-side resource options. Because it no longer operates its generating units, many of the IRP filing requirements are no longer applicable to Big Rivers and are not discussed herein.

#### Existing Power Supply

Big Rivers' current power supply consists largely of contracts to purchase power from LEM and SEPA. Table 1 shows Big Rivers' load forecast through 2017 and the maximum capacity and energy available under these contracts. Big Rivers' purchase contracts with LEM and SEPA are for firm power. Table 1 shows that Big Rivers projects that it will have surplus capacity through 2017. The LEM contract, which accounts for most of Big Rivers' power supply, includes liquidated damages for non-delivery; therefore, unlike utilities that operate generating facilities, Big Rivers is not required to maintain a reserve margin. Big Rivers also has access to the wholesale power markets to buy and sell power as needed subject to market availability.

Table 1: Load Forecast, Capacity, Peak Demand, and Energy Requirements

Year	System Peak Demand (MW) <sup>1</sup>	Total Energy Requirements for Generation Service (MWh) <sup>2</sup>	LEM Contract Maximum Capacity (MW)	LEM Contract Maximum Energy (MWh)	SEPA Contract Maximum Capacity (MW)	SEPA Contract Maximum Energy (MWh)	Total Capacity (MW)	Capacity Surplus (MW)
2002	641	3,298,001	597	5,327,285	178	267,000	775	134
2003	688	3,625,665	597	5,327,285	178	267,000	775	87
2004	699	3,676,821	597	5,327,285	178	267,000	775	76
2005	711	3,734,545	597	5,327,285	178	267,000	775	64
2006	722	3,783,971	597	5,327,285	178	267,000	775	53
2007	698	3,537,386	597	5,327,285	178	267,000	775	77
2008	711	3,596,195	597	5,327,285	178	267,000	775	64
2009	723	3,650,147	597	5,327,285	178	267,000	775	52
2010	735	3,705,392	597	5,327,285	178	267,000	775	40
2011	749	3,766,818	717	6,321,741	178	267,000	895	146
2012	761	3,823,153	800	7,008,000	178	267,000	978	217
2013	774	3,880,729	800	7,008,000	178	267,000	978	204
2014	788	3,943,476	800	7,008,000	178	267,000	978	190
2015	801	4,002,583	800	7,008,000	178	267,000	978	177
2016	814	4,061,689	800	7,008,000	178	267,000	978	164
2017	827	4,120,796	800	7,008,000	178	267,000	978	151

1 System peak demand represents the sum of rural system coincident peak demand plus all non-rural demand, net of smelters, plus transmission losses.

2 Total energy requirements include transmission losses of 1.39 percent.

Weyerhaeuser, a customer of Kenergy Corporation, recently purchased the paper processing facilities formerly operated by Willamette Industries. In 2001, Willamette installed 85 MW of cogeneration facilities, which has reduced Big Rivers' demand and energy requirement obligation. Big Rivers indicated it would be evaluating the feasibility of making a capital investment at the Weyerhaeuser facility to allow excess steam to be recycled and used to generate up to an additional 20 to 30 MW of capacity. It also indicated that it expected to complete its cost estimate and feasibility study of such an investment in October of 2003. Big Rivers has yet to make a filing with the Commission regarding its study. Staff recommends that Big Rivers file, in its next IRP if not sooner, its cost estimate and feasibility study regarding a possible capital investment in the Weyerhaeuser facility.

### Supply-Side Evaluation

Big Rivers analyzed the costs of the alternative sources shown in Table 2 and compared them to the costs associated with its LEM contract. The analysis quantifies the fixed and variable costs of power supply resources. Fixed costs include interest, depreciation, and fixed O&M expenses. Variable costs include fuel expenses and non-fuel variable operating expenses. Tables 2a and 2b below show the key inputs used in Big Rivers' supply-side screening model.

**Table 2: Supply-Side Sources Evaluated**

- 1) Pulverized Coal
- 2) Coal Gasification
- 3) Conventional Combined Cycle Combustion Turbine
- 4) Advanced Combined Cycle Combustion Turbine
- 5) Conventional Simple Cycle Combustion Turbine
- 6) Advanced Simple Cycle Combustion Turbine
- 7) Fuel Cells
- 8) Distributed Generation – Base Load
- 9) Distributed Generation – Peak Load
- 10) Biomass
- 11) Landfill Gas
- 12) Geothermal
- 13) Wind
- 14) Solar Thermal
- 15) Photovoltaic
- 16) Hydroelectric

**Table 2a: Key Inputs in Supply-Side Screening Model**

Technology	Capital Cost \$/kW	Regional Multiplier	Adjusted Capital Cost	Constr. Period	Serv. Life
Pulverized Coal	1,119.00	1.004	1,123.48	4	30
Coal Gasification CC	1,338.00	1.004	1,343.35	4	30
Conventional CC	456.00	1.004	457.82	3	30
Advanced CC	590.00	1.004	592.36	3	30
Conventional CT	339.00	1.004	340.36	2	30
Advanced CT	474.00	1.004	475.90	2	30
Fuel Cess	2,091.00	1.004	2,099.36	3	30
Base Distributed	623.00	1.004	625.49	3	30
Peak Distributed	559.00	1.004	561.24	2	30
Biomass	1,725.00	1.004	1,731.90	4	30
Landfill Gas	1,429.00	1.004	1,434.72	3	30
Geothermal	1,746.00	1.004	1,752.98	4	30
Wind	982.00	1.004	985.93	3	30
Solar Thermal	2,539.00	1.004	2,549.16	3	30
Photovoltaic	3,831.00	1.004	3,846.32	2	30
Hydroelectric	1,700.00	1.000	1,700.00	2	30

**Table 2b: Key Inputs in Supply-Side Screening Model**

Technology	Primary Fuel	Variable O&M mill/kWh	Fixed O&M \$/kW	Capacity Factor	Heat Rate
Pulverized Coal	Coal	3.38	23.41	90.00%	9.386
Coal Gasification CC	Coal	0.80	32.67	90.00%	7.869
Conventional CC	Gas	0.52	15.61	80.00%	7.618
Advanced CC	Gas	0.52	14.46	80.00%	6.870
Conventional CT	Gas	0.10	6.45	25.00%	11.380
Advanced CT	Gas	0.10	9.16	25.00%	9.020
Fuel Cess	Gas	2.08	14.98	70.00%	5.744
Base Distributed	Gas	15.11	4.02	90.00%	10.991
Peak Distributed	Gas	23.10	12.56	25.00%	10.620
Biomass	None	2.90	44.95	80.00%	N/A
Landfill Gas	None	0.01	96.31	98.00%	N/A
Geothermal	None		70.07	50.00%	N/A
Wind	None		25.54	50.00%	N/A
Solar Thermal	None		47.87	50.00%	N/A
Photovoltaic	None		9.85	50.00%	N/A
Hydroelectric	None		6.67	50.00%	N/A

Big Rivers points out that some of these alternatives will not be available to it due to geographical or other constraints. However, the comparison shows that the cost of alternatives will be more expensive than its LEM contract's costs. Figures 1 through 3 below show the total costs of the various power supply options Big Rivers compared.

Figure 1

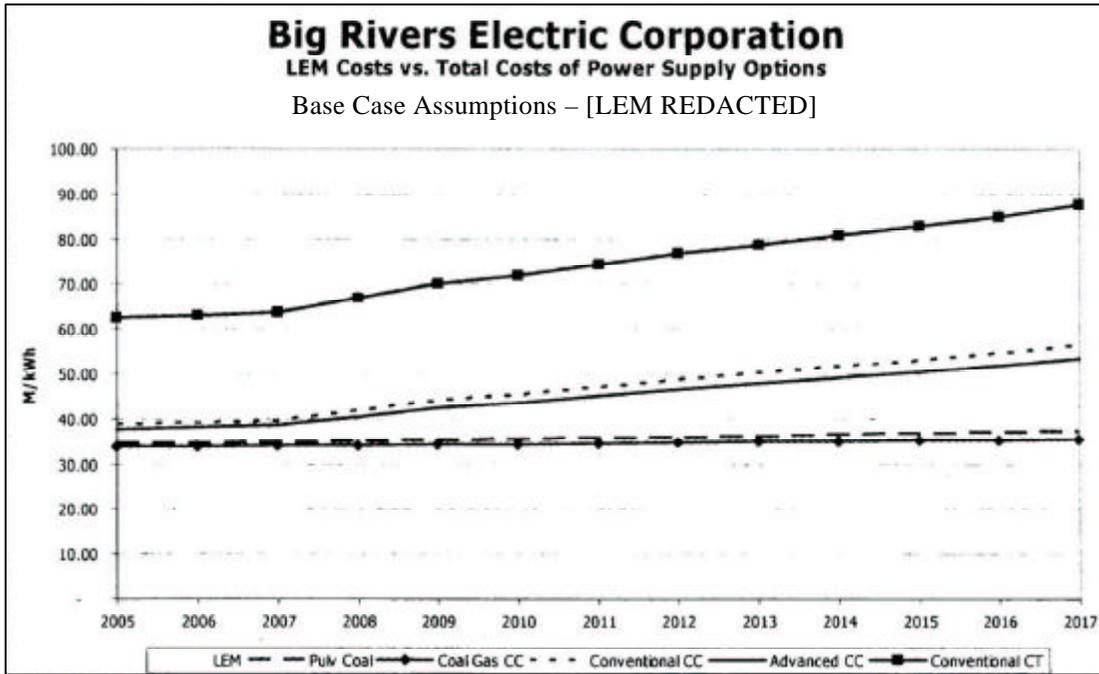


Figure 2

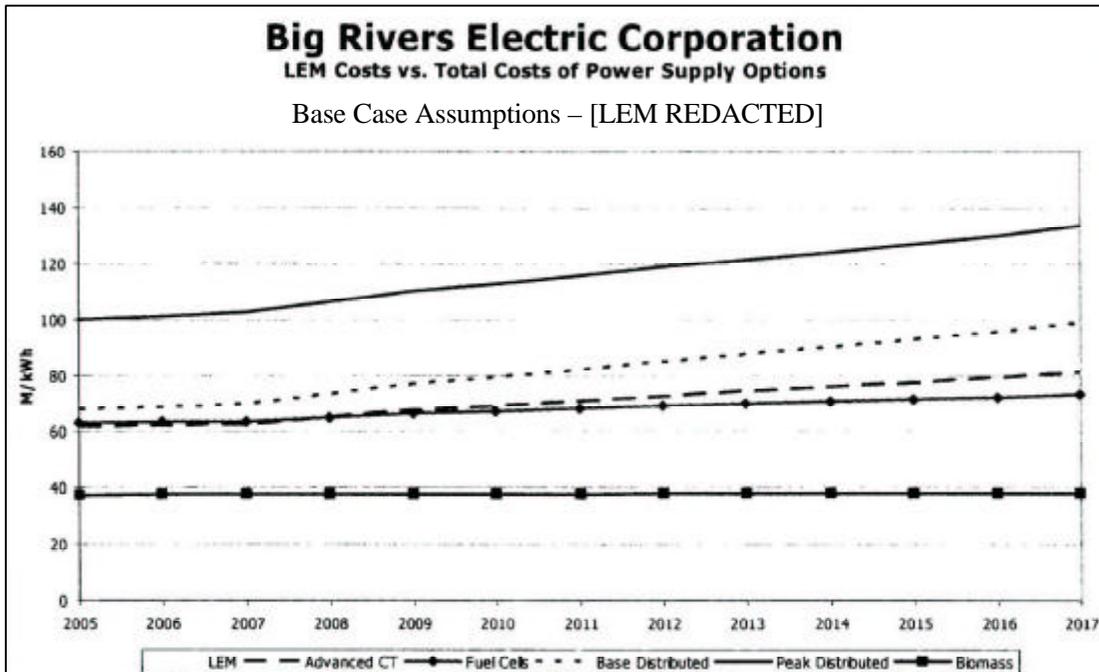
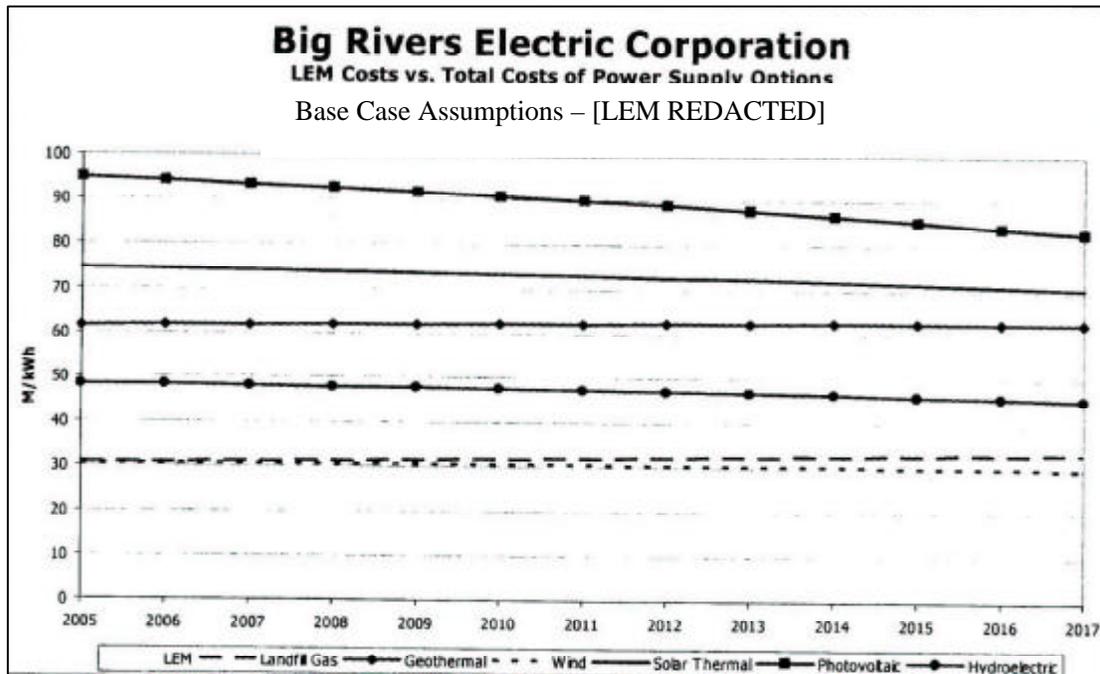


Figure 3



Discussion of Reasonableness

Based on the results of its load forecast, Big Rivers does not project a need to add generation during the 15-year forecast period. Its analysis of supply-side options shows the existing LEM contract to be the lowest cost supply-side resource available to it over the foreseeable future. Given the results, Staff believes it is reasonable that Big Rivers has no plans to add additional resources over the forecast period, other than its investigation of a possible investment at the Weyerhaeuser facility that could generate an additional 20-30 MW.

Recommendations

Commission Staff agrees with Big Rivers regarding the lack of need for additional supply-side resources during the forecast period. However, the Staff believes that Big Rivers should continue to consider alternatives such as the potential investment at the Weyerhaeuser facility which was an issue in this proceeding. Therefore, Staff will repeat its recommendation that Big Rivers file, in its next IRP if not sooner, its cost estimate and feasibility study regarding a possible capital investment in the Weyerhaeuser facility.

## SECTION 5

### INTEGRATION AND PLAN OPTIMIZATION

The final step in the IRP process is the integration of supply-side and demand-side options to arrive at the optimal integrated resource plan. This section will discuss integration issues and how they were addressed by Big Rivers.

#### Integration Issues

Due to it having need for no additional generating capacity over its fifteen-year planning horizon, Big Rivers' integration process is much less extensive than what is typical. Big Rivers completed a DSM study in late 2002, the results of which were included in its IRP. The study identified new programs for inclusion in Big Rivers' three-year action plan that are educational in nature and designed to help consumers conserve energy. Due to the educational nature of the programs, no energy and peak demand savings estimates were developed for the IRP.

Big Rivers' analysis of supply-side resources included coal-fired generation, gas-fired generation, distributed generation, fuel cells, and renewable energy. Coal-fired generation, landfill gas, and wind-powered options had the lowest "all-in" costs, but none of these options were less costly than Big Rivers' existing power supplies. While it forecasts no new capacity needs over its planning horizon, Big Rivers is evaluating the purchase of blocks of renewable power for customers with an interest in purchasing renewable power.

Big Rivers is also analyzing distributed generation as a complement to traditional transmission planning. Its analysis focuses on the feasibility of using distributed generation in remote areas instead of making capital additions to transmission facilities. This evaluation is in anticipation that, at some future point, Big Rivers will be required to make additional investment in facilities in order to maintain its existing standards of reliability.

#### Discussion of Reasonableness

The Staff's report on Big Rivers' 1999 IRP included two recommendations related to integration and optimization. They were as follows:

- Big Rivers should update the Commission on the status of its 62-MW distributed generation project on a quarterly basis, and provide copies of that update to the parties in this case. Such updates should begin one month from the issuance of this report, and continue until the project is operational or until Big Rivers has decided upon an alternative solution.

- Big Rivers should discuss, in significant detail in its next IRP filing, its efforts relative to the 1999 IRP's recommendations to continue evaluation of the combined commercial/industrial load management plan; to encourage the use of distributed generation among its members to lower peak demands and energy requirements and provide greater flexibility in power supply operations; to maintain an ongoing dialogue with other power suppliers regarding low cost energy and capacity sources; and to monitor the progress of state and federal legislation to determine its potential impacts upon the Big Rivers system.

Big Rivers finalized work related to the distributed generation project (Willamette, now Weyerhaeuser) in "mid 2001" and made the required filings with the Commission. Throughout its IRP, Big Rivers discussed a number of issues related to the second recommendation included in the Staff's report on its 1999 IRP. Hence, Staff is satisfied that Big Rivers has adequately responded to those previous recommendations.

### Recommendations

Given that Big Rivers did not undertake a traditional integration and optimization process in its IRP, Staff has no recommendations on Big Rivers' integration process. However, it is important for future IRPs, particularly if circumstances change to the point that Big Rivers forecasts a need for additional resources, that the process be robust and that it give equal weight to demand-side and supply-side resources.

With that in mind, Staff will merely reiterate the recommendations contained in Sections 3 and 4 of this report regarding demand-side and supply-side issues that are applicable to Big Rivers. Of course, if circumstances should change and Big Rivers have a need for new capacity, its next IRP will need to evaluate and integrate demand-side and supply-side alternatives into a more traditional optimal resource plan.