ORIGINAL

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

IN RE: PETITION FOR DETERMINATION OF NEED FOR AN ELECTRICAL POWER PLANT IN LAKE COUNTY BY PANDA LEESBURG POWER PARTNERS, L.P.	)))))	DOCKET NO. 000288-EU

DIRECT TESTIMONY OF

ROBERT L. DAVIS

ON BEHALF OF

PANDA LEESBURG POWER PARTNERS, L.P.

April 24, 2000

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

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DIRECT TESTIMONY OF ROBERT L. DAVIS

Q. Please state your name and business address.

A. Robert L. Davis, 800 North Magnolia Avenue, Suite 300, Orlando, Florida 32803.

Q. What is your occupation?

A. I am presently employed as a Principal Engineer by R. W. Beck, Inc.

Q. Please describe R. W. Beck, Inc.

A. R. W. Beck, Inc. is a corporation of engineers and consultants founded in 1942 for the purpose of rendering professional engineering and consulting services in planning, financing, operating and designing facilities for utilities and energy users. Exhibit PAA-1, described in the Testimony of Witness Paul A. Arsuaga, contains additional information regarding R. W. Beck, Inc.

Q. Please summarize your educational background and your experience in the electric utility industry.

A. I received a Bachelor of Science Degree in Engineering Sciences from the University of Florida, Gainesville, Florida in 1984. I have over 17 years of experience in the electric utility industry, including ten years of experience associated with economic and production simulation modeling of electric power facilities. For the last three years, I have been responsible for developing and managing R. W. Beck's modeling and evaluation of deregulated electric power markets throughout the Southeast, Mid-Atlantic and Midwest United States. Exhibit RLD-1 provides a brief description of my employment history and professional experience.

Q. On whose behalf do you appear in this proceeding?

A. I am appearing on behalf of Panda Leesburg Power Partners, L.P. ("Panda Leesburg").

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

A. The purpose of my testimony is the following:

1. I will describe the production simulation model and input data used to project wholesale energy costs and fuel consumption for Peninsular Florida over a study period beginning with the planned installation date of the Panda Leesburg Power Project (the "Project") in May of 2003 through the end of 2008 (the "Study Period").
2. My testimony will show that beginning with the installation of the Project in 2003:
   a. wholesale energy costs in Peninsular Florida are projected to decrease;
   b. fuel consumption in Peninsular Florida is projected to decrease; and
   c. emissions of sulfur dioxide ("SO_2") and nitrous oxides ("NO_X") in Peninsular Florida are projected to decrease.

Q. Have you prepared exhibits to support your testimony?

A. Yes. Exhibits RLD-2 through RLD-6 were prepared by me or under my supervision.

Q. Are you also sponsoring any of the Exhibits contained in the Petition for a Determination of Need for the Panda Leesburg Power Project?

A. Yes. I am sponsoring Exhibits Needs-G through Needs-I (Tables 7 through 9) contained under the Needs tab in the Petition for a Determination of Need for the Panda Leesburg Power Project (the "Petition"), and Sections B and C contained on pages 8 and 9 under the same tab in the Petition. The projections contained in these exhibits are superceded by the information contained herein.

PROJECTED PROJECT OPERATION

Q. Have you prepared projections of Project dispatch, fuel use and operating costs?

A. Yes. Exhibit RLD-2 contains projections of annual capacity factors, generation, variable operating costs, natural gas fuel use, average variable operating costs ($/MWh), and average annual operating heat rate (Btu/kWh) for the Project over the Study Period.

Q. Please explain Exhibit RLD-2.

A. Exhibit RLD-2 provides a tabulation of projected annual generation and capacity factors for the Project. The values presented in the exhibit were developed using a generation production simulation model of the Florida Reliability Coordinating Council ("FRCC", also referred to as "Peninsular Florida") plus portions of the Southeastern Electric Reliability Council ("SERC") and the Southwest Power Pool ("SPP"), all of which are regions of the North American Electric Reliability Council ("NERC"). Hereinafter, I have collectively referred to these regions as the "Modeled Region".

The dispatch of the Project was evaluated under two cases, a Base Case and an Alternative Case. The Base Case simulates a dispatch of resources throughout the Modeled Region that includes generating resources that have been defined by Witness Paul A. Arsuaga as "Committed Resources" and excludes those resources defined by Witness Paul A. Arsuaga as "Uncommitted Resources". Both of these cases were modeled with and without the Project and another generating project proposed by Panda Energy International, Inc. for development in the FRCC, the Panda Midway Power Project, to be located in St. Lucie County, Florida. Hereinafter, these two projects are collectively referred to as the "Projects". The Alternative Case was developed under the same assumptions regarding the Committed and Uncommitted Resources but also assumes that a winter season 20% reserve margin is maintained over the Study Period through the addition of efficient combined cycle generation units and the Projects.

As reflected in Exhibit RLD-2, annual capacity factors for the Project are projected to range between 68% and 74% over the Study Period under both the Base and Alternative Case assumptions. That is, the Project is projected to operate for more than 6,000 hours in each full year of the Study Period and produce an average of approximately 6,250 net gigawatt-hours (GWh) of energy each year of the Study Period. The quantity of energy generated by the Project is approximately equal to the annual energy requirements of 450,000 residential homes in Peninsular Florida (assuming 14,000 kilowatt-hours per year of energy consumption for an average-sized residential dwelling).

Exhibit RLD-2 also provides projections of total and average variable operating costs for the Project. After the first year of operation, 2003, a partial year of operation, the annual variable operating costs of the Project (fuel plus variable operation and maintenance costs) are projected to average approximately $143.8 million per year over the remainder of the Study Period, expressed in year 2000 dollars. The average variable operating cost of the Project is projected to be approximately $22.94 per megawatt-hour ($/MWh) over the same period. Exhibit RLD-2 also provides annual projections of fuel consumption and average annual heat rates for the Project. After the first partial year of operation, the projected average annual quantity of natural gas consumed by the Project over the remainder of the Study Period is approximately 44,981 billion British thermal units (GBtu) per year. The annual operating heat rate for the Project, which is computed as the ratio of fuel consumed to energy generated, is projected to average 7,182 Btu/kWh after the first partial year of operation.

Q. Are the projections contained in Exhibit-2 identical to operating performance and costs anticipated for the Project by Panda Leesburg?

A. No, not necessarily. It is important to note that projections presented within Exhibit-2, and elsewhere within this testimony, reflect operating efficiencies and variable costs that were assumed for the Project that are typical of generating resources that are of the same technology and vintage as the Project, but which might be different than what is presented by other witnesses for Panda Leesburg in this proceeding. The assumptions and techniques used to develop the projections presented herein, which were created for study purposes, were designed to interject conservatism into the projected benefits attributable to the Project. For instance, in modeling heat rates and variable operating costs for the Project, we have applied generic assumptions regarding degraded heat rates and variable operating costs that are reasonable and conservative for generating resources that are similar in technology and vintage to the Project.

PROJECTED REDUCTIONS OF WHOLESALE ENERGY COSTS AND FUEL CONSUMPTION FOR THE FRCC

Q. Have you prepared projections of reductions of wholesale energy costs and fuel consumption that are attributable to the Project?

A. Yes. I have prepared to Exhibits RLD-3 through RLD-5 to present the results of the production simulation model and demonstrate that wholesale energy costs and fuel consumption in the FRCC are projected to decline with the installation and operation of the Project.

Q. Please explain your Exhibit RLD-3.

A. Exhibit RLD–3 provides a tabulation of projected energy cost savings for Peninsular Florida that are a direct result of the Project under the Base and

Alternative Cases. Column (b) provides a projection of the annual net energy for load for Peninsular Florida over the Study Period; Column (c) provides a projection of total energy cost for Peninsular Florida over the Study Period assuming the Projects are not installed and operating; Column (d) provides a projection of total energy cost for Peninsular Florida over the Study Period assuming that both Projects are installed and operating; Column (e) provides a projection of total energy cost savings for Peninsular Florida attributable to both Projects; Column (f) provides a projection of total energy cost savings for Peninsular Florida attributable to the Project; and Column (g) reflects the projected reduction in average wholesale energy prices for Peninsular Florida, calculated as the ratio of Column (f) to Column (b).

As identified in Exhibit RLD-3, annual energy savings attributable to the Project under the Base Case are projected to average between $41.3 and $54.6 million following the initial partial year of operation, expressed in year 2000 dollars. Stated another way, as a direct result of the Project, wholesale energy prices in Peninsular Florida would be reduced by approximately 0.44 $/MWh under the Base Case assumptions, which amounts to a 2.3% reduction from projected average wholesale energy costs when the Project is not installed and operating. Similarly, annual energy savings attributable to the Project under the Alternative Case are projected to average between $41.3 and $51.2 million over the Study Period and reduce wholesale energy costs by an average of 0.42 $/MWh, or 2.2%.

Benefits attributable to the Project were computed by assessing net reductions in operating costs for generating resources in the FRCC, plus net reductions in energy costs for imports into the FRCC, plus net increases in energy revenues from exports out of the FRCC. Under both the Base Case and the Alternative Case, assessments of total benefits were made by computing the net difference in costs and revenues produced under two different resource configurations: (i) the Projects were installed and operating over the Study Period, and (ii) the Projects were not installed and were not available to operate over the Study Period. When the Projects were installed and operating, net energy costs are projected to be less, thus resulting in the finding that the Project is projected to result in cost savings to Peninsular Florida.

Energy cost savings attributable to only the Project were computed by taking one-half of the savings attributable to both Projects. Through this approach, the savings attributable to the Project are conservative, since benefits computed by evaluating the incremental impact of a single Project would be greater than one-half of the total attributable to both Projects.

Furthermore, the lower ranges of savings projected under the Alternative Case are conservative, since we have assumed that under this case all future generation units added in Peninsular Florida during the Study Period, other than a few of the Committed Resources, will use combined cycle technology the same as modeled for the Projects. After the Projects are added in 2003, we have assumed that 1,000 MW of combined cycle capacity are added in Peninsular Florida to maintain a 20% reserve margin through the end of the Study Period. However, it is doubtful that all future capacity additions in Peninsular Florida will be combined cycle technology. Instead, I believe that some future additions will employ less efficient simple cycle technology, which if installed in place of the combined cycle capacity would increase the projected savings attributable to the Project.

Q. Have any fixed costs been included in the projection of cost savings shown in Exhibit RLD-3?

A. No. Only savings in fuel and variable operation and maintenance expenses have been reflected in the energy cost savings.

Q. Can you explain what causes the energy cost savings in Peninsular Florida over the Study Period?

A. Yes. The level of projected savings is primarily attributable to three things: (i) the efficiency of the Project as compared to other existing and planned units that are projected to operate to meet electric loads in Peninsular Florida; (ii) projected changes in fuel use in Peninsular Florida that occur when the Project is operating; and (iii) differences in prices for fuels that are consumed by the Project and those for other generating resources in Peninsular Florida whose operation is displaced by the Project.

When the Project operates to serve load in Peninsular Florida, the higher efficiency and lower operating cost of the Project causes generation from other less efficient and more costly resources to be displaced. Reductions in fuel consumption and changes in the types of fuel consumed, which occur as a result of the Project's operation, produce the energy cost savings. I have prepared Exhibits RLD-4 and RLD-5 to explain the projected energy cost and fuel consumption savings for Peninsular Florida that are attributable to the Project over the Study Period.

Q. Please explain Exhibit RLD-4.

A. Exhibit RLD-4 provides a tabulation of energy and costs that are projected to be displaced by the operation of the Projects under the Alternative Case over each full year of Project operation within the Study Period (i.e., 2004 through 2008). Exhibit RLD-4 also provides a comparison of average operating costs of the Projects to those of resources that are displaced as a result of operating the Projects. The Alternative Case was chosen over the Base case as the representative case for this exhibit because it provides a slightly more conservative projection of benefits. Exhibit RLD-4 is arranged as follows.

Rows 1 through 6 provide a tabulation of annual quantities of displaced energy in gigawatt-hours (GWh) for Peninsular Florida that are projected to occur following the installation and operation of the Projects. Rows 7 through 12 provide a tabulation of annual energy cost savings in millions of dollars, expressed in year 2000 dollars, for Peninsular Florida that are projected to occur following the installation and operation of the Projects. Rows 13 through 18 provide a tabulation of average operating cost in dollars per megawatt-hour ($/MWh), expressed in year 2000 dollars, for the Projects and other resources in Peninsular Florida and illustrates the high cost of resources that are displaced through the operation of the Projects and the average incremental cost savings that are projected for Peninsular Florida from the operation of the Projects. Changes in total energy and costs attributable to the Project are one-half of the values presented in Exhibit RLD-4 for both Projects, and changes in average or incremental costs presented in Exhibit RLD-4 for both Projects are the same as those for the Project.

Q. Have any fixed costs been included in the projection of cost savings shown in Exhibit RLD-4?

A. No. Only savings in fuel and variable operation and maintenance expenses have been reflected in the cost savings.

Q. What conclusions can you draw from Exhibit RLD-4?

A. Energy cost savings associated with the operation of the Project are primarily attributable to the difference in the average variable operating cost of the Project as compared with those of other resources in Peninsular Florida. As evidenced by Rows 13 through 18 in Exhibit RLD-4, the average variable operating cost of the Projects is projected to be lower than the variable operating cost of many other resources in Peninsular Florida, resulting in the displacement of energy costs that otherwise would have been produced by these less efficient, more costly resources.

Furthermore, because the Projects effectively lower the average cost of energy in Peninsular Florida, the region is less dependent on purchases from imported power sources and electric utilities in Peninsular Florida will be better positioned to make economy sales (exports) to the wholesale market outside of Peninsular Florida. As evidenced by Rows 1 through 6 in Exhibit RLD-4, imports are projected to decline with the installation and operation of the Projects and exports are projected to increase, resulting in a net increase in generation within Peninsular Florida. However, even with a net increase in generation within Peninsular Florida, total costs of generation and purchases for Peninsular Florida are projected to be lower than they otherwise would be without the Projects.

Reductions in energy costs for generation with natural gas produce approximately 52% of the cost reductions projected for generating resources and import into Peninsular Florida, resulting in average annual savings of approximately $171 million over the 2004 through 2008 period, expressed in year 2000 dollars. Reductions in energy costs for generation with heavy oil produce the next largest savings, resulting in approximately 28% of the cost reductions projected for generating resources and import for Peninsular Florida. Average annual cost savings from reduced generation with heavy oil are projected to be $93.3 million over the 2004 through 2008 period. Reductions in costs for generation with other fuels, plus reductions in costs for economy imports, plus increases in revenues for economy exports result in additional savings for Peninsular Florida of $116.4 million per year over the 2004 through 2008 period. When offset by the variable cost of generation for the Projects, which are projected to average $287.3 million per year over the 2004 through 2008 period, net average annual savings to Peninsular Florida attributable to both Projects are projected to total $93.3 million over the Study Period, expressed in year 2000 dollars, or half that value for the Project.

Q. Do the projected net increases in exports from Peninsular Florida represent sales that are being made from the Project to regions other than Peninsular Florida?

A. No. The vast majority of energy produced by the Project is projected to remain in Peninsular Florida and result in lower energy costs within the State. The Project is projected to make sales outside of Peninsular Florida less than 2% of the time over the Study Period. The increase in exports from Peninsular Florida are largely attributable to economy sales from existing generating resources in Peninsular Florida that are less efficient and more costly to operate than the Project, but whose output has been made available as a result of the Project operating to serve load in Peninsular Florida and displacing the required operation of these resources.

Q. Please explain Exhibit RLD-5.

A. Exhibit RLD-5 provides tabulations of energy and fuel use that are projected to be displaced by the operation of the Projects under the Alternative Case.

Exhibit RLD-5 also compares the average efficiency of the Projects to that of the resources that are displaced as a result of operating the Projects, in terms of average operating heat rates. As with Exhibit RLD-4, the Alternative Case was chosen over the Base Case as the representative case for the exhibit because it provides a slightly more conservative projection of benefits. Exhibit RLD-5 is arranged as follows.

Rows 1 through 6 provide a tabulation of annual quantities of displaced energy in gigawatt-hours (GWh) for Peninsular Florida that are projected to occur following the installation and operation of the Projects. Rows 7 through 12 provide a tabulation of projected annual fuel savings in billions of British thermal units (GBtu) for Peninsular Florida that are projected to occur following the installation and operation of the Project. Rows 13 through 18 provide a tabulation of average operating heat rates in British thermal units per kilowatt-hour (Btu/kWh) for the Project and other resources in Peninsular Florida, and illustrate the high efficiency of the Project as compared to the less efficient resources that are projected to be displaced through the operation of the Project.

Q. What conclusions can you draw from Exhibit RLD-5?

A. Projected fuel savings associated with the operation of the Projects are primarily attributable to differences in heat rates for the Projects as compared with heat rates for resources that are displaced through the operation of the Projects. As evidenced by Rows 13 through 18 in Exhibit RLD-5, the average heat rate of the Projects is projected to be lower than the average heat rate of many other resources in Peninsular Florida, resulting in the displacement of fuel that otherwise would have been consumed by these less efficient resources.

As evidenced by Rows 7 through 8 in Exhibit RLD-5, average annual fuel savings resulting from the operation of the Projects are projected to be 90.0 GBtu per year over the period 2004 through 2008. Projected fuel consumption by type of fuel is projected to decline by approximately 8%, 15% and 54% for natural gas, heavy oil and light oil, respectively, and by less than 1% for other fuel types. Usage of natural gas by the Projects is projected to be approximately equal to the quantity of fuel displaced from other generating resources in the Peninsular Florida, averaging 89.9 GBtu per year over the 2004 to 2008 period.

Q. If net imports into Peninsular Florida are reduced and generation within Peninsular Florida is increased with the installation and operation of the Projects, as indicated in Exhibit RLD-4, how do these factors impact changes in fuel use in Peninsular Florida?

A. Exhibit RLD-4 indicates that with the installation and operation of the Projects and the overall improvement in efficiency that the Projects are projected to provide to

Peninsular Florida, imports into Peninsular Florida would decrease and exports out of Peninsular Florida would increase, resulting in a net increase in generation within Peninsular Florida. However, as evidenced by Rows 7 through 12 in Exhibit RLD-5, even with this projected increase in generation in Peninsular Florida, total fuel consumption in the region, including the fuel used by the Projects, is projected to remain approximately unchanged.

Moreover, as evidenced by Rows 13 through 18 in Exhibit RLD-5, the average operating heat rate of the Projects is projected to be approximately 27% lower on average than the resources it displaces. These improvements in efficiency signify that the Project would generate the same amount of energy as the resources it displaces while consuming approximately one-fourth less fuel. If net imports into and exports out of Peninsular Florida did not change, then fuel consumption in Peninsular Florida, including fuel use by the Projects, would decline by approximately 2% over total levels that are projected when the Projects are not operating.

With regard to only those resources consuming natural gas, operation of the Projects is projected to result in efficiency improvements of approximately 25% over the resources they displace. As a result, not only are the Projects projected to reduce energy costs due to their more efficient use of natural gas, but by using natural gas more efficiently to produce the same amount of energy, the Projects could also free-up natural gas capacity and volumes for future growth and other uses within Peninsular Florida that otherwise would have been consumed by less efficient generating resources (assuming the natural gas is not used by others to make economy sales outside Peninsular Florida).

PROJECTED REDUCTIONS OF EMISSIONS

Q. If the consumption of certain fuels is reduced as a result of the installation and operation of the Project, would these reductions also result in reductions of emissions?

A. Yes. Reductions in the consumption of heavy and light oil and small reductions in the consumption of other fuels, which are projected to occur with the installation and operation of the Project, will result in reductions of sulfur dioxide (SO_2) that would otherwise be emitted by generating resources in Peninsular Florida. Additionally, the installation and operation of the Project will result in reductions of nitrous oxides (NO_X) that would otherwise be emitted by generating resources in Peninsular Florida. I have prepared Exhibit RLD-6 to demonstrate the projected reductions in emissions of SO_2 and NO_X.

Q. Please describe Exhibit RLD-6.

A. Exhibit RLD-6 applies the fuel savings (in GBtu's) identified in Exhibit RLD-5, divides these values in half to represent changes in fuel consumption for a the Project, and multiplies these values by historical average values for emissions generated in Peninsular Florida in pounds of emissions generated per MMBtu of fuel consumed. The product of these values, when computed by major fuel type, produces an estimate of emissions that would be avoided through the installation and operation of the Project. These computations indicate that an average of 11,452 tons of SO_2 and 2,891 tons of NO_X are projected to be avoided each year over the period 2004 through 2008 with the installation and operation of the Project.

Q. Do the computations presented in Exhibit RLD-6 include a representation of increases in resource generation for Peninsular Florida that are projected to occur with the installation and operation of the Project?

A. Yes. The net reduction in emissions for Peninsular Florida that are projected to occur with the installation and operation of the Project represent a total net reduction in emissions, and include both the effect of emissions generated by the Project as well as the effects produced by the projected increase in generation in the Peninsular Florida. Even though generation in Peninsular Florida is projected to increase with the installation and operation of the Project, emissions are still projected to decline by the amounts stated in Exhibit RLD-6. When stated as a percent reduction in the total tons emitted, annual SO_2 emissions in Peninsular Florida are projected to decline by approximately 2% and NO_X emissions in Peninsular Florida are projected to decline by approximately 1%.

PRODUCTION SIMULATION MODEL AND DATA SOURCES

Q. What is the source of the values presented in your Exhibits RLD-2 through RLD-6?

A. As previously identified, a generation production simulation model of the Southeast U.S. was used to project the effects that the Project would have on resource generation and fuel use in Peninsular Florida.

Q. Please describe the production simulation model used to project the dispatch of resources and energy cost in Peninsular Florida over the study period.

A. The production simulation model used to project the dispatch of resources and energy cost in Peninsular Florida is a collection of input data files representing loads, generating and purchase power resources, and transmission interconnection within the Modeled Region for use with the dispatch simulation model PROSYM™. PROSYM™ is a computer model that Beck leases from Henwood Energy Services, Inc. ("HESI"), which is capable of simulating on an hourly basis economic decisions on generation commitment and dispatch and wholesale transaction throughout an integrated electric system.

It is my understanding that PROSYM™ has become an industry-accepted production simulation model that has been in use by the energy industry for over fifteen years. PROSYM™ is currently used by over 120 electric utilities, developers, power marketers, consultants and regulators throughout the world, and by over 80% of the largest of these entities in North America, including several of the utilities in Peninsular Florida. Furthermore, it is my understanding that PROSYM™ has been reviewed and evaluated in many regulatory forums throughout the U.S.

Typical input for the model includes hourly load profiles for each year of the study period, generation characteristics for existing and future generation resources (such as maximum seasonal capacity ratings, heat rate or efficiency curves, forced and maintenance outage rates, fuel type and pricing, and variable operation and maintenance costs), and data on major transmission interfaces and constraints.

Typical output from the model includes projections of generation, capacity factor, fuel consumption, fuel expense, and variable operation and maintenance expense for each generating resource modeled. Interface load flows and economy energy transactions, and resource operation and expenses summarized by fuel type, resource type and region are also available.

Q. Please identify the primary sources for the data used to develop the production simulation model.

A. The primary sources of data used to develop the production simulation model include the following:

1. FRCC 1999 Regional Load & Resource Plan dated July 1999 ("1999 Load and Resource Plan");
2. Ten Year Site Plans filed during 1999 by various electric utilities in Florida, most of them dated April 1999;
3. Ten Year Site Plans filed in April 2000 by Florida Power & Light Company, Florida Power Corporation, Tampa Electric Company, Duke Energy New Smyrna Beach Power Company, Okeechobee Generating Company, and Oleander Power Project;
4. Supplemental data to the 1998 Ten Year Site Plans filed with the FPSC by various electric utility in Florida;
5. FERC Form 1 reports for various investor-owned utilities;
6. Utilities Commission, City of New Smyrna Beach, Duke Energy New Smyrna Beach Power Company LTD., L.L.P., Joint Petition for

Determination of Need for the New Smyrna Beach Power Project, dated August 19, 1998 filed with the Florida Public Service Commission ("FPSC") (FPSC Docket No. 981042–EM);

7. Petition for Determination of Need for an Electrical Power Plant in Okeechobee County by Okeechobee Generating Company, L.L.C. (FPSC Docket No. 991462-EU);

8. U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2000*, dated December 1999 ("AEO 2000");

9. Historical natural gas hub prices from *Inside FERC's Gas Market Report*;

10. HESI database of generating resources, purchase power resources and transmission interconnections for the NERC regions of FRCC, SERC and SPP;

11. Resource Data International POWERdat™ database;

12. Resource Data International Basecase™ database;

13. Florida Department of Environmental Protection ("FDEP") staff and FDEP databases of air construction permit applications and awards;

14. NERC Generation Availability Report database for 1999 ("GADS Data");

15. Contracts governing Florida-Southern transmission interface allocations;

16. Testimony filed before FERC in the Carolina Power & Light/Florida Power Corporation merger case (FERC Docket No. EC00-55-000);

17. The U.S. Environmental Protection Agency, Acid Rain Program, Emissions Scorecard Report for 1998;

18. Industry news stories of announced plans for new resource additions in the FRCC made by developers and electric utilities; and

19. Panda Leesburg (for data regarding the Project).

Q. **Are there settings and other operational decisions to be made by the user in order to properly operate the PROSYM™ model?**

A. Yes, there are numerous setting. Training and frequent use of the program is required to operate the model properly. R. W. Beck has been a licensee of PROSYM™ since 1991, and I have been using PROSYM™ since that time. I have attended several training classes administered by HESI staff, and I have personally spent numerous hours in discussions with HESI staff concerning modeling techniques and practices for issues that are not thoroughly covered in their various PROSYM™ manuals and technical briefs.

Q. **Please describe the HESI database identified as a source of data used to develop the production simulation model.**

A. HESI licenses database management software and a proprietary database of generating and purchased power resources, transmission interconnections, and hourly loads and forecasts, collectively entitled the Electric Market Simulation System ("EMSS™"). It is my understanding that HESI has developed the EMSS™ database from various public and private sources of information. R. W. Beck leases this product as an initial point from which to begin our regional modeling efforts.

Once obtained, R. W. Beck set about a process to review and modify the EMSS™ database to conform to modeling assumptions and information maintained by R. W. Beck. These modifications are performed for a number of reasons, and may entail improvements to the database to reflect greater knowledge of the regions and utilities being modeled, more current data reported by utilities and developers, and different assumptions for resource operating characteristics. Once modifications to the EMSS™ database are completed, the EMSS™ software is used to create input files to be used in the PROSYM™ production simulation model. These input files are then reviewed and modified as necessary. Additional data files may also be created to supplement the input files generated by EMSS™.

Q. **Please describe the major processes that were used to review the EMSS™ database and develop the input files that were used in the production simulation model.**

A. First, reasonable care was used to review the major input items to the model to assure that they agree with available public reports filed by electric utilities. Data items reviewed include:

1. Seasonal capacity ratings for all generating resources;
2. Retirement dates for all generating resources (when available);
3. Planned generating resource reratings and fuel conversions;
4. Generating resource prime mover and primary fuel types;
5. Generating resource heat rates;
6. Capacity ratings and terms for firm transactions;
7. Generating resource equivalent availability factors;
8. Historical hourly load profiles;
9. Forecast load and energy growth; and
10. Fuel price forecast.

Second, when publicly available data was not readily available to use as a check against the information contained in EMSS™ or to use as input to the model, the data provided by HESI was reviewed for reasonableness and consistency and adopted as appropriate. The final step in reviewing the data was to review the results. If the results are reasonable and explainable and are consistent with recent history, then these were good indications that the input data is suitable for the intended purposes of the analysis.

Based on the review conducted on the input data and the results of the model, I believe that the inputs to the model are reasonable for the purpose of developing the projected benefits of the Project as presented in my testimony.

Q. Do you believe that all data items used in your production simulation model are reasonably accurate?

A. Yes. However, inaccuracies or omissions in the data are possible for the following reasons. First, there is a voluminous amount of data required to operate the model, and as such it is possible that some data used in the model may be inconsistent with operating characteristics that have been reported by the owners of the resources reflected in the model.

Second, some resource operating characteristics are considered proprietary and the resource owners do not generally release data on these characteristics. Instead, assumptions for these operating characteristics were reflected in the model by developing characteristics that are typical for the type of generating resource. For instance, generating resource forced outage and maintenance rates were developed based on historical operating data contained in the GADS report, which is summarized and categorized by generating resource prime mover type. Using general operating characteristics such as the GADS data may result in operating characteristics for specific generating resources that are not precisely accurate for individual resources. Instead, these characteristics are approximate for a given class of resources in the model, and on average should result in a reasonable approximation of operating characteristics for resources throughout Peninsular Florida. Using consistent data assumptions for a given class of resources in this manner is a generally accepted practice in the industry.

Third, some resource operating characteristics reflected in the model were developed from commercially available data sources developed by others and licensed by R. W. Beck. While I believe that these commercially accepted data sources are generally accurate, I cannot attest to the accuracy of all data items contained therein.

Q. What would be the consequences if some of the data items used in your production simulation model are incorrect?

A. In general, because of the substantial volume of data contained in the model, any single data item, other than those describing the Project, is not likely to have a consequential effect on the results of the model. Furthermore, inaccuracies or inconsistencies that might exist in the data could have opposing effects in the model, and as such, the results of the model may not be materially affected even when many data items are not explicitly accurate.

Absent some unforeseen, fundamental change to the model, I do not believe that minor changes and/or refinements in the input data would materially alter the results or conclusions presented herein.

Q. What assumptions did you make when creating the production simulation model to assure that the benefits you have projected for the Project are reasonable?

A. In my development of the model, I have attempted to use conservative assumptions whenever data was not available to explicitly model certain generating resources or other input data. For instance, when modeling the Project, power augmentation capacity planned for the Project was not modeled. Because power augmentation from the Project can be used to displace less efficient and more costly peaking resources in Peninsular Florida, projected energy and fuel savings would be larger than the values presented herein had this portion of the Project been modeled. Additionally, with regard to the modeling of new combined and simple cycle resource additions throughout the Modeled Region, I have assumed generic resource operating characteristics that are conservative and consistent with the assumptions used for the Project. In this way, the operating characteristics modeled for the Project did not provide the Project with a dispatch or cost advantage over other expansion resources.

The topology assumed for control areas and interconnecting transmission systems within the Modeled Region also added to the conservative nature of the production simulation model and the projected results for the Project. I have assumed that a large, cooperative and efficient system exists for dispatching generating resources throughout the Modeled Region. The Modeled Region was broken into five large, interconnected control areas: the FRCC, Southern, TVA, VACAR and Entergy areas. Within each of these areas, resources were dispatched jointly to serve load, with consideration given to available energy from the other areas that could be purchased at incremental variable cost to displace local generation.

In actual practice, over thirty separate utility control areas operate within the Modeled Region, each with a primary responsibility to serve its native load first before entering into arrangements to sell surplus power to other wholesale entities, many times at prices that are significantly higher than the incremental cost of generation. As such, these actual conditions create a less than optimum dispatch of generating resources. Even with the availability of numerous energy trading systems and practices in Florida and elsewhere, the maximum level of resource dispatch efficiency that can be obtained within the existing configuration of utility systems is less than what could be obtained if utilities were to combine and dispatch their resources jointly within large areas, as was done for the production simulation model and the results presented herein.

Given the conservative nature of the assumptions used to develop the production simulation model and the efficient arrangement of the modeled system, I believe that the projections of benefits attributable to the Project that have been presented herein are reasonable and conservative.

Q. Does this conclude your testimony?

A. Yes.

PROFESSIONAL RESUME
ROBERT L. DAVIS

EDUCATIONAL BACKGROUND

Bachelor of Science Degree, Engineering Sciences
University of Florida, Gainesville, Florida, June, 1984
Interdisciplinary Focus on Alternative Energy Technologies

PROFESSIONAL EMPLOYMENT

1990-Present	Principal Engineer in the firm of R. W. Beck, Inc. Responsible for or assisted in various long range and operational studies relating to deregulated wholesale power markets, power supply and demand-side resource planning, production costing analyses, risk and probabilistic analyses, joint dispatch and utility partnership arrangements, load diversity analyses, and RFP development and evaluation. Specializing in the modeling of wholesale electricity prices in deregulated markets, and financial analysis and long-range planning of integrated generation and demand-side resources. Responsible for developing and managing the Firm's market pricing models and analyses throughout the Central, Mid-Atlantic, Southeast, and Midwest U.S., including the reliability planning districts of FRCC, SERC, MAAC, ECAR and SPP. Experience also includes fuel procurement and contracting, cogeneration/IPP assessment and contracting, alternative generation technologies, wholesale and retail rate design, utility cost of service analyses, load and customer forecasting, customer appliance and preference surveying, and financial reporting for revenue bond issues.
1984-1989	Senior Utility Analyst, Gainesville Regional Utilities, City of Gainesville, Florida. Utility analyst in the Strategic Planning Department of the municipal electric, natural gas, water and wastewater utility. Responsible for design, evaluation and monitoring of utility demand-side management and conservation programs, including, cost-effectiveness evaluations, program design and development, customer contract development, and regulatory reporting. Served as the utility's liaison to local Utility Planning Board and FCG committees.

RELEVANT EXPERTISE

Modeling of Electric Power Markets

- Investigation of Trends in Deregulation
- Market Price Projections
- Market Revenue Projections
- Stranded Cost Analyses

Mr. Davis has investigated proposed deregulation of electric power markets throughout the United States, including the various rules and procedures being proposed in different regions of the country relating to the implementation of power exchanges and independent system operators, bidding and pricing mechanisms for market resources (i.e., pricing for energy, capacity, ancillary services, capacity reserves, transmission congestion, etc.), and different techniques for assessing utility stranded costs. As part of these investigations, Mr. Davis has researched methodologies and software tools that are available to model and project market prices and revenue and has recommended the acquisition of software tools and use of analytical techniques to clients and the Firm.

Mr. Davis has developed multi-utility, multi-regional dispatch models of the Central, Mid-Atlantic, Midwest, Northeast and Southeast United States, and has used these models to project market clearing prices for utilities, developers, power marketers, lending institutions and industrial customers. These models incorporate detailed information regarding resource operating characteristics and transmission interconnections and constraints. Mr. Davis has developed seasonal, time-differentiated projections of market energy and capacity prices based on the results of these models and has used these projections to predict revenues and operating costs under a deregulated wholesale electric power market.

Additionally, Mr. Davis has been involved with studies investigating the potential levels of stranded costs that utilities may face under a deregulated environment. He has developed projections of market revenue by utility and resource developed as a result of regional dispatch analyses, and has compared these market revenues to fixed obligations and operating costs to assess potential levels of costs that would not be covered through market revenues.

Integrated Resource Planning

- Production Costing
- Probabilistic and Risk Analysis
- Power Supply RFP Development and Analysis
- Conservation and Demand-Side Management
- Fuel Requirements/Procurement
- Cogeneration/IPP

Mr. Davis' experience in integrated resource planning for utilities incorporates conservation and demand-side planning, generation production costing analysis, supply- and demand-side RFP development and evaluation, probabilistic and risk analysis, fuel requirements and procurement assessment, bidding for utility and non-utility power producers, direct load control planning, and alternative generation technology assessment. He has performed various production costing analyses for power supply planning and operating cost projections, including research and screening of nontraditional technologies such as solar power, circulating fluidized-bed combustors, and fuel cells. He has drafted and analyzed requests for power supply proposals from utility and non-utility generators, evaluated contractual arrangements between non-utility generators and electric utilities, and developed long-range projections of electric utility payments for capacity and energy received from non-utility generators. He has also developed probabilistic models to analyze the uncertainties inherent in power supply planning, thereby assessing the associated range and probabilities of potential outcomes.

Mr. Davis has performed feasibility and cost effectiveness analyses of conservation, direct load control and interruptible load programs, including analyses of impacts to marginal operating costs, avoidance of capacity and purchased power costs for planned resource expansion, and impacts to wholesale and retail rates. He has reviewed and assessed regulatory trends and has developed planning recommendations for utilities relating to conservation and cogeneration/IPP. He has also participated on statewide planning committees responsible for the development of demand-side management and self-service wheeling cost effectiveness rule making.

Load Forecasting and Customer Service

- End-Use and Econometric Forecasting
- Customer Preference Surveys
- Demand-Side Research

Mr. Davis' range of expertise includes end-use and econometric forecasting, implementation of load research programs, surveys of customer preferences and demographics, surveys of appliance saturation and dwelling characteristics, market research on demand-side management potential, and preparation of ordinance tariffs and customer contracts. Mr. Davis has prepared demand, energy and customer forecasts for utilities and has developed forecasts of appliance saturation and dwelling types that incorporate appliance efficiency trends and impacts. He has developed probabilistic models for projecting on- and off-peak consumption periods and has developed incentive rates to promote off-peak consumption. He has also drafted customer contracts and municipal ordinances and tariffs relating to demand-side management programs and electric service rates.

Rates and Financial Analyses

- Cost of Service
- Marginal Cost Analyses
- Interchange Pricing
- Incentive Rates
- Embedded Costs Allocation

Mr. Davis has performed financial analyses involving projections of revenue requirements and debt coverage, marginal and embedded cost of service, determination of interchange pricing, development of incentive rates for promoting off-peak consumption and economic development, and production and embedded costs allocation for joint utility efforts.

SELECTED RECENT CONSULTING ASSIGNMENTS

Power Market Assessment, Panda Energy International, Inc. – Projections of market revenues and prices for energy and capacity to support power project feasibility analyses in the FRCC, SPP and Entergy Sub-region.

FRCC Power Market Assessment, Large Power Marketer/Developer (Confidential) – Twenty-year projection of the market price for energy and capacity in the FRCC.

Resource Market Value Assessment, Orlando Utilities Commission – Deregulated electric market analysis comparing future market value of OUC's Indian River Steam Plant against offers to purchase facilities.

Generating Asset Appraisal, Duquesne Light Company – Evaluation of projected market revenues for generating assets transferred between Duquesne Light Company and FirstEnergy Corporation.

Independent Review of Market Revenue Projections, Tenaska Georgia Partners – Review of market price and revenue projections for Tenaska Georgia power project as part of an independent engineering review for financing.

Stranded Cost Analysis, Confidential Municipal Joint Action Agency – Market revenue projections for stranded cost analysis of generation resources and purchase power contracts.

Power Market and Stranded Cost Analysis, Texas-New Mexico Power Company – Evaluation of projected market revenues for TNP generating assets.

FRCC Power Market Assessment, Generation Developer (Confidential) – Power market assessment of the FRCC to determine economic feasibility of new merchant peaking facilities.

Power Market Assessments, Major Industrial Clients – Market price projections to assist two different industrial clients with making capital decisions in deregulated electric utility markets in Florida and Louisiana.

Market Saturation Assessment, Major Generation Developer/Owner (Confidential) – Assessment of several Northeast U.S. power markets to determine current over/under supply conditions and capability of market to support additional combined cycle facilities.

Independent Review of Market Revenue Projections, LS Power Batesville Generation Facility – Review of market price and revenue projections for the LS Power Batesville power project as part of an independent engineering review for financing.

SELECTED PUBLICATIONS AND SPEAKING ENGAGEMENTS

Arsuaga, P. A. and Davis, R. L. – *"Should You be in the Generation Business, Finding the Hidden Value of Capacity"*, Power-Gen Conference, Orlando, Florida, December 1998.

Davis, R. L. – *"Electric Utility Opportunities for Demand-Side Management and Alternative Resource Technologies"*, Caribbean Energy Conference & Trade Exposition, St. Thomas, U.S. Virgin Islands, October 1994.

Davis, R. L. – *"Commercial Lighting – A Profitable Utility Conservation Program"*, Guest Lecturer, APPA Workshop, Washington, DC, 1988.

RECORD OF TESTIMONY

Regulatory Forum	Proceeding	Petitioner/Matter	Client	Subject of Testimony	Date
Public Utility Commission of Texas	SOAH Docket No. 473-95-1820, PUC Docket No. 15100	Golden Spread Electric Cooperative, Inc., Determinations Required by 32K of the Public Utility Holding Act and for Certification of Contract	Golden Spread Electric Cooperative, Inc.	Independent Evaluation of Requests for Proposals by Section 32K of the Public Utility Holding Act and Certification of Contracts	1995/ 1996
Florida Public Service Commission	Docket No. 950446-EG	Adoption of Numeric Conservation Goals and Consideration of National Energy Policy Act for the Ocala Electric Utility	Florida Municipal Power Agency and Ocala Electric Utility	Evaluation of demand-side management measure cost-effectiveness for Ocala Electric Utility	1995
Florida Public Service Commission	Docket No. 950455-EG	Adoption of Numeric Conservation Goals and Consideration of National Energy Policy Act for the City of Vero Beach, Florida	City of Vero Beach, Florida	Evaluation of demand-side management measure cost-effectiveness for the City of Vero Beach, Florida	1995

Panda Leesburg Power Project
Projected Annual Project Operation

Base Case (Committed Resources)

Year	Capacity Factor	Generation (GWh)	Variable Operating Costs ($M)	Natural Gas Fuel Use (GBtu)	Average Variable Cost ($/MWh)	Average Operating Heat Rate (Btu/kWh)
2003 [1]	68%	3,987	84.0	28,522	21.06	7,155
2004	68%	6,000	130.7	43,075	21.79	7,179
2005	70%	6,123	137.0	43,982	22.37	7,183
2006	71%	6,258	144.3	44,982	23.06	7,188
2007	73%	6,412	151.3	46,053	23.59	7,183
2008	74%	6,523	156.0	46,815	23.91	7,176
Avg. 2004-08	71%	6,263	143.8	44,981	22.94	7,182

Alternative Case (20% Reserve Margin)

Year	Capacity Factor	Generation (GWh)	Variable Operating Costs ($M)	Natural Gas Fuel Use (GBtu)	Average Variable Cost ($/MWh)	Average Operating Heat Rate (Btu/kWh)
2003 [1]	68%	3,987	84.0	28,522	21.06	7,155
2004	68%	6,000	130.7	43,075	21.79	7,179
2005	70%	6,123	137.0	43,982	22.37	7,183
2006	71%	6,258	144.3	44,982	23.06	7,188
2007	73%	6,412	151.3	46,053	23.59	7,183
2008	74%	6,481	155.0	46,560	23.92	7,184
Avg. 2004-08	71%	6,255	143.7	44,930	22.95	7,183

[1] Reflects partial year of operation beginning May 1, 2003.

Panda Leesburg Power Project
Projected Annual FRCC Cost Savings
(2000 $'s)

Base Case (Committed Resources)

(a)	(b)	(c)	(d)	(e)	(f)	(g)
		Annual Energy Cost Savings				
Year	FRCC Net Energy For Load (GWh)	Total Cost without the Projects ($M)	Total Cost with both Projects ($M)	Total Change in Costs ($M)	Change Attributable to the Project ($M)	Change in Wholesale Energy Prices ($/MWh)
2003 [1]	143,034	2,669.7	2,618.9	(50.8)	(25.4)	(0.35)
2004	209,492	3,848.7	3,766.1	(82.6)	(41.3)	(0.39)
2005	214,094	4,027.4	3,940.7	(86.8)	(43.4)	(0.41)
2006	218,611	4,227.5	4,130.0	(97.5)	(48.7)	(0.45)
2007	223,179	4,410.9	4,308.5	(102.4)	(51.2)	(0.46)
2008	227,645	4,568.8	4,459.6	(109.2)	(54.6)	(0.48)
Avg. 2004-08	218,604	4,216.7	4,121.0	(95.7)	(47.8)	(0.44)

Alternative Case (20% Reserve Margin)

		Annual Energy Cost Savings				
Year	FRCC Net Energy For Load (GWh)	Total Cost without the Projects ($M)	Total Cost with both Projects ($M)	Total Change in Costs ($M)	Change Attributable to Project ($M)	Change in Wholesale Energy Prices ($/MWh)
2003 [1]	143,034	2,669.7	2,618.9	(50.8)	(25.4)	(0.35)
2004	209,492	3,848.7	3,766.1	(82.6)	(41.3)	(0.39)
2005	214,094	4,027.4	3,940.7	(86.8)	(43.4)	(0.41)
2006	218,611	4,227.5	4,130.0	(97.5)	(48.7)	(0.45)
2007	223,179	4,410.9	4,308.5	(102.4)	(51.2)	(0.46)
2008	227,645	4,508.3	4,410.8	(97.5)	(48.7)	(0.43)
Avg. 2004-08	218,604	4,204.6	4,111.2	(93.3)	(46.7)	(0.43)

[1] Reflect savings from a partial year of operation beginning May 1, 2003.

FPSC Docket No. 000288-EU
Exhibit RLD-4

Panda Leesburg & Panda Midway Power Projects
Projected FRCC Energy Cost Savings
Alternative Case (Committed Resources)

Projected Change in FRCC Resource Operation
(GWh)

Line	Year	Operation of Projects (GWh)	Displaced Generation by Major Fuel Type: Nat. Gas (GWh)	Heavy Oil (GWh)	Light Oil (GWh)	Coal (GWh)	Other (GWh)	Subtotal (GWh)	Change in Interchange Energy: Imports (GWh)	Exports (GWh)	Net Chg. (GWh)	Net Change in Energy (GWh)
1	2004	12,001	(5,660)	(2,719)	(32)	(367)	(36)	(8,813)	(1,029)	2,159	(3,188)	0
2	2005	12,246	(5,747)	(2,969)	(43)	(354)	(42)	(9,156)	(994)	2,096	(3,089)	0
3	2006	12,516	(5,730)	(3,157)	(65)	(297)	(33)	(9,283)	(1,184)	2,049	(3,233)	0
4	2007	12,824	(5,900)	(2,990)	(79)	(300)	(44)	(9,312)	(1,237)	2,274	(3,511)	0
5	2008	12,963	(5,687)	(3,254)	(90)	(246)	(46)	(9,322)	(1,135)	2,505	(3,640)	0
6	Avg	12,510	(5,745)	(3,018)	(62)	(313)	(40)	(9,177)	(1,116)	2,216	(3,332)	0

Projected Change in FRCC Resource Operating Costs
(2000 $'s)

Line	Year	Operating Cost of Projects ($M)	Displaced Operating Costs by Major Fuel Type: Nat. Gas ($M)	Heavy Oil ($M)	Light Oil ($M)	Coal ($M)	Other ($M)	Subtotal ($M)	Change in Interchange Cost/Rev.: Imports ($M)	Exports ($M)	Net Chg. ($M)	Total ($M)
7	2004	261.5	(157.7)	(82.6)	(2.1)	(6.1)	(1.9)	(250.4)	(45.8)	47.8	(93.7)	(82.6)
8	2005	273.9	(164.7)	(92.0)	(2.9)	(5.8)	(2.6)	(268.1)	(45.1)	47.6	(92.6)	(86.8)
9	2006	288.6	(173.1)	(97.2)	(4.5)	(5.0)	(1.7)	(281.5)	(53.9)	50.6	(104.6)	(97.5)
10	2007	302.5	(182.9)	(93.2)	(5.5)	(4.9)	(3.0)	(289.4)	(58.1)	57.5	(115.6)	(102.4)
11	2008	310.1	(176.5)	(101.6)	(6.3)	(4.0)	(3.0)	(291.5)	(53.7)	62.4	(116.1)	(97.5)
12	Avg	287.3	(171.0)	(93.3)	(4.3)	(5.2)	(2.4)	(276.2)	(51.3)	53.2	(104.5)	(93.3)

Projected Average Operating Cost of FRCC Resources
(2000 $'s)

Line	Year	Avg. Oper. Cost of Projects ($/MWh)	Average Operating Cost of Displaced Resources: Nat. Gas ($/MWh)	Heavy Oil ($/MWh)	Light Oil ($/MWh)	Coal ($/MWh)	Other ($/MWh)	Subtotal ($/MWh)	Avg. Cost/Price of Interchange: Imports ($/MWh)	Exports ($/MWh)	Net Chg. ($/MWh)
13	2004	21.79	27.86	30.38	66.89	16.68	53.57	28.42	44.56	22.14	29.38
14	2005	22.37	28.66	30.99	67.66	16.44	60.96	29.28	45.33	22.69	29.98
15	2006	23.06	30.21	30.79	68.88	16.66	51.88	30.32	45.57	24.70	32.34
16	2007	23.59	30.99	31.16	69.34	16.46	67.54	31.07	46.95	25.27	32.91
17	2008	23.92	31.05	31.23	69.76	16.28	66.38	31.27	47.30	24.91	31.90
18	Avg	22.97	29.76	30.93	68.88	16.52	60.83	30.09	46.00	23.99	31.36

Panda Leesburg & Panda Midway Power Projects
Projected FRCC Fuel Savings
Alternative Case (Committed Resources)

Projected Change in FRCC Generating Resource Operation
(GWh)

Line	Year	Operation of Projects (GWh)	Displaced Generation by Major Fuel Type						Net Change in Generation (GWh)
			Nat. Gas (GWh)	Heavy Oil (GWh)	Light Oil (GWh)	Coal (GWh)	Other (GWh)	Subtotal (GWh)	
1	2004	12,001	(5,660)	(2,719)	(32)	(367)	(36)	(8,813)	3,188
2	2005	12,246	(5,747)	(2,969)	(43)	(354)	(42)	(9,156)	3,090
3	2006	12,516	(5,730)	(3,157)	(65)	(297)	(33)	(9,283)	3,233
4	2007	12,824	(5,900)	(2,990)	(79)	(300)	(44)	(9,312)	3,511
5	2008	12,963	(5,687)	(3,254)	(90)	(246)	(46)	(9,322)	3,640
6	Avg	12,510	(5,745)	(3,018)	(62)	(313)	(40)	(9,177)	3,333

Projected Change in FRCC Generating Resource Fuel Consumption
(GBtu)

Line	Year	Natural Gas Use by Projects (GBtu)	Displaced Fuel Consumption by Major Fuel Type						Net Change in Fuel Use (GBtu)
			Nat. Gas (GBtu)	Heavy Oil (GBtu)	Light Oil (GBtu)	Coal (GBtu)	Other (GBtu)	Subtotal (GBtu)	
7	2004	86,149	(53,816)	(27,564)	(417)	(3,639)	(429)	(85,865)	284
8	2005	87,963	(54,588)	(30,169)	(577)	(3,487)	(480)	(89,301)	(1,338)
9	2006	89,965	(55,388)	(31,999)	(871)	(2,935)	(395)	(91,587)	(1,622)
10	2007	92,107	(57,142)	(30,348)	(1,044)	(2,960)	(476)	(91,970)	136
11	2008	93,120	(54,073)	(32,981)	(1,205)	(2,425)	(499)	(91,183)	1,937
12	Avg	89,861	(55,001)	(30,612)	(823)	(3,089)	(456)	(89,981)	(121)

Projected Average Operating Heat Rate of FRCC Resources
(Btu/kWh)

Line	Year	Avg. Oper. Heat Rate of Projects (Btu/kWh)	Average Operating Heat Rate of Displaced Resources					
			Nat. Gas (Btu/kWh)	Heavy Oil (Btu/kWh)	Light Oil (Btu/kWh)	Coal (Btu/kWh)	Other (Btu/kWh)	Subtotal (Btu/kWh)
13	2004	7,179	9,503	10,138	13,159	9,922	11,961	9,743
14	2005	7,183	9,493	10,161	13,345	9,840	11,357	9,753
15	2006	7,188	9,666	10,135	13,320	9,864	12,094	9,866
16	2007	7,183	9,685	10,151	13,276	9,868	10,848	9,876
17	2008	7,184	9,509	10,137	13,360	9,848	10,946	9,781
18	Avg	7,183	9,574	10,144	13,307	9,871	11,380	9,805

Panda Leesburg Power Project
Projected FRCC Emission Reductions
Alternative Case (Committed Resources)

Projected Change in FRCC Generating Resource Fuel Consumption (GBtu)

Line	Year	Natural Gas Use by the Project (GBtu)	Displaced Fuel Consumption by Major Fuel Type: Nat. Gas (GBtu)	Heavy Oil (GBtu)	Light Oil (GBtu)	Coal (GBtu)	Other (GBtu)	Subtotal (GBtu)	Net Change in Fuel Use (GBtu)
1	2004	43,075	(26,908)	(13,782)	(209)	(1,820)	(215)	(42,933)	142
2	2005	43,982	(27,294)	(15,084)	(289)	(1,744)	(240)	(44,650)	(669)
3	2006	44,982	(27,694)	(15,999)	(436)	(1,467)	(197)	(45,794)	(811)
4	2007	46,053	(28,571)	(15,174)	(522)	(1,480)	(238)	(45,985)	68
5	2008	46,560	(27,037)	(16,490)	(602)	(1,213)	(249)	(45,591)	969
6	Avg	44,930	(27,501)	(15,306)	(411)	(1,545)	(228)	(44,991)	(60)

Estimated Change in Sulfur Dioxide (SO2) Emissions (Tons)

Line	Year	Estimated Project SO2 Emissions (tons)	Reduced Emissions of SO2: Nat. Gas (tons)	Heavy Oil (tons)	Light Oil (tons)	Coal (tons)	Other[2] (tons)	Subtotal (tons)	Net Change in SO2 Emissions (tons)
Est. Emission Rate by Fuel Type (lb/MMBtu)[1]		**0.006**	**0.006**	**1.350**	**0.191**	**1.310**	**1.068**		
7	2004	129	(81)	(9,303)	(20)	(1,192)	(115)	(10,710)	(10,581)
8	2005	132	(82)	(10,182)	(28)	(1,142)	(128)	(11,561)	(11,430)
9	2006	135	(83)	(10,800)	(42)	(961)	(105)	(11,991)	(11,856)
10	2007	138	(86)	(10,242)	(50)	(969)	(127)	(11,475)	(11,336)
11	2008	140	(81)	(11,131)	(58)	(794)	(133)	(12,197)	(12,057)
12	Avg	135	(83)	(10,332)	(39)	(1,012)	(122)	(11,587)	(11,452)

Estimated Change in Nitrous Oxide (NOX) Emissions (Tons)

Line	Year	Estimated Project NOX Emissions (tons)	Reduced Emissions of NOX: Nat. Gas (tons)	Heavy Oil (tons)	Light Oil (tons)	Coal (tons)	Other[2] (tons)	Subtotal (tons)	Net Change in NOX Emissions (tons)
Est. Emission Rate by Fuel Type (lb/MMBtu)[1]		**0.132**	**0.132**	**0.467**	**0.119**	**0.511**	**0.428**		
13	2004	2,843	(1,776)	(3,218)	(12)	(465)	(46)	(5,517)	(2,674)
14	2005	2,903	(1,801)	(3,522)	(17)	(445)	(51)	(5,838)	(2,935)
15	2006	2,969	(1,828)	(3,736)	(26)	(375)	(42)	(6,007)	(3,038)
16	2007	3,040	(1,886)	(3,543)	(31)	(378)	(51)	(5,889)	(2,849)
17	2008	3,073	(1,784)	(3,850)	(36)	(310)	(53)	(6,034)	(2,961)
18	Avg	2,965	(1,815)	(3,574)	(24)	(395)	(49)	(5,857)	(2,891)

[1] From US EPA, Acid Rain Program, Emissions Scorecard Report for 1998. Reflects averages for resources owned by FRCC utilities.
[2] Reflects average emission rate for all resource and fuel types in the FRCC.