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

PAUL A. ARSUAGA

ON BEHALF OF

PANDA LEESBURG POWER PARTNERS, L. P.

April 24, 2000

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. FPSC DOCKET NO. 000288-EU

DIRECT TESTIMONY OF PAUL A. ARSUAGA

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Paul A. Arsuaga, 800 North Magnolia Avenue, Suite 300, Orlando, Florida 32803-3274.

Q. WHAT IS YOUR OCCUPATION?

A. I am presently employed as a Principal and Senior Director 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 provides information about the firm's experience and qualifications.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND YOUR EXPERIENCE IN THE ELECTRIC UTILITY INDUSTRY.

A. I received a Bachelor of Science degree in Electrical Engineering in 1969 from Tulane University, New Orleans, Louisiana. I also received a Master of Business Administration degree in 1975 from the University of Hawaii, Honolulu, Hawaii. I am a registered engineer in the states of Florida, Mississippi, and Missouri. I have over 30 years of experience in planning utility infrastructure, which includes 23 years

associated with planning electric power facilities. Exhibit PAA-1 provides a brief description of my employment history and professional experience. Exhibit PAA-2 provides the history and qualifications of RW Beck, Inc.

Q. ON WHOSE BEHALF ARE YOU APPEARING 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. My independent analysis will show the following:

1. The addition of the Panda Leesburg Power Project (the "Project") in 2003 will increase the reliability of power supply in peninsular Florida by increasing the level of electric generating capacity reserves.
2. The Project is currently the most cost-effective alternative available to Panda for supplying wholesale power.

In addition, I will summarize the results of Mr. Davis' analysis of wholesale electric energy costs and discuss the consequences of delay.

Q. HAVE YOU PREPARED EXHIBITS TO SUPPORT YOUR TESTIMONY?

A. Yes. Exhibits PAA–3 through PAA-8 were prepared by me or under my supervision.

Q. DID YOU ALSO PREPARE EXHIBITS CONTAINED IN THE PETITION FOR DETERMINATION OF NEED FOR THE PANDA MIDWAY POWER PROJECT, DATED MARCH 6, 2000 (THE "PETITION")?

A. Yes, I prepared Attachments Need-A through Need-F, and pages 1 through 7 of the narrative entitled "Consistency of the Panda Leesburg Power Project with the Power Supply Need of peninsular Florida." Exhibits PAA-3 through PAA-8 supersede Attachments Need-A through Need-F of the Petition.

Q. PLEASE IDENTIFY THE SOURCES FOR THE DATA USED TO PREPARE THE EXHIBITS.

A. The sources of data include the following:

1. The Florida Reliability Coordinating Council ("FRCC") "*1999 Regional Load & Resource Plan*," dated July 1999, ("1999 Regional Plan").
2. 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 and filed with the Florida Public Service Commission ("FPSC") (FPSC Docket No. 981042 -EM).
3. Petition for Determination of Need for an Electrical Power Plant in Okeechobee County by Okeechobee Generating Company, L.L.P (FPSC Docket No. 991462-EU)
4. U. S. Department of Energy, Energy Information Administration, "*Annual Energy Outlook 2000*," containing projections to 2020 and dated December 1999 ("AEO 2000")
5. Site Certification Application by Kissimmee Utility Authority ("KUA") and Florida Municipal Power Agency ("FMPA") for the addition of Unit 3 to the Cane Island Power Park (FPSC Docket No. 980802-EM)
6. "*Florida Department of Environmental Protection Air Resources Management*

System Permit Report" Dated February 21, 2000.

7. Individual Ten-year Site Plans prepared by Investor Owned Utilities and other entities.

8. Industry Publications.

Q. HAS PANDA SUBMITTED A PETITION FOR DETERMINATION OF NEED RELATING TO ANOTHER POWER PLANT IN FLORIDA?

A. Yes. Panda Midway Power Partners L.P. ("Panda Midway") has submitted a petition of need for an electrical power plant that will be located in St. Lucie County, Florida. Collectively, I have referred to both the Project and Panda Midway as (the "Projects").

Q. IN YOUR EVALUATION OF THE PROJECT, DID YOU HAVE REASON TO REFLECT PANDA MIDWAY?

A. Yes, in evaluating the reserve margins in the FRCC and in evaluating the impact on wholesale electric energy prices in the FRCC, Panda Midway was included.

Q. WHY DID YOU INCLUDE PANDA MIDWAY?

A. In evaluating the reserve levels in the FRCC, including Panda Leesburg results in higher reserve levels with or without the Project and thus is more conservative from the standpoint of establishing capacity need. With respect to the evaluation of wholesale electric energy prices, dividing the total impact of both Projects by to arrive at an average impact on a per Project basis results in a conservative estimate of the benefit derived from the first Project to be placed in service. I believe the first Project will have more benefit than the second Project if each is considered incrementally. I

believe that calculating the average benefit of both Projects is the appropriate way to consider each of these Projects since the Projects are making simultaneous applications.

Q. PLEASE EXPLAIN EXHIBIT PAA-3.

A. Exhibit PAA-3 shows a list of the Uncommitted Resources and additional Committed Resources that were considered in the analysis to calculate electric generating capacity reserves during the summer in peninsular Florida. This list is shown for the years 1999 through 2008. The list of Uncommitted Resources was primarily taken from information prepared by the electric utilities in Florida as reported in the 1999 Regional Plan. The list of additional Committed Resources was taken from information filed before the Florida Public Service Commission ("FPSC"), the Florida Department of Environmental Protection ("FDEP") and industry publications.

The summer capacity rating for each generating resource is first shown for the year of the announced in-service date and then every year thereafter. Although many parties have announced plans to construct electric generating resources in peninsular Florida, I believe that because of varying circumstances, only a portion of the announced electric generating resources will actually be constructed when planned or constructed at all. To distinguish between these announced resources I have defined two terms: Committed and Uncommitted Resources. A Committed Resource is a resource with one of the following characteristics:

1. The entity planning the resource has filed a Petition for Need Determination before the FPSC.
2. The resource has a capacity rating of less than 75 MW or is not a steam or solar generating facility and the entity planning the resource has been issued an air

construction permit from the FDEP.

All other announced resources were considered Uncommitted Resources for the purposes of this analysis.

The first part of Exhibit PAA-3, lines 1 through 30, shows a list of the Uncommitted Resources which were not used in the analysis. As shown on line 30, Uncommitted Resources total to 453 MW in 2001 and 6,512 MW by 2008. The second part of the table shows the additional Committed Resources not reported in the 1999 Regional Plan. Total Additional Committed Resources, as shown on line 41, total to 2,801 MW by 2002 and 6,643 MW by 2008. Only Committed Resources were used in the analysis to calculate electric generating reserves.

Q. ARE THE TERMS COMMITTED RESOURCES AND UNCOMMITTED RESOURCES GENERIC, WELL DEFINED TERMS THAT ARE COMMONLY USED IN THE ELECTRIC INDUSTRY?

A. These terms or similar terms are commonly used in the industry. However, I am not sure that each of these terms is commonly defined that everyone would agree with my definition. I believe that the exact definition may be moot. The most important aspect is that the terms are used consistently for all resources within my analysis, which has been done.

Q. IS EXHIBIT PAA-4 SIMILAR TO EXHIBIT PAA-3, EXCEPT THAT IN PREPARING EXHIBIT PAA-4 YOU USED WINTER CAPACITY RATINGS AND LOAD INFORMATION IN PLACE OF SUMMER CAPACITY RATINGS AND LOAD INFORMATION?

A. Yes.

Q. PLEASE EXPLAIN YOUR EXHIBIT PAA-5.

A. Exhibit PAA-5 shows for the FRCC a projection of summer peak capacity, demand and capacity reserve margin for peninsular Florida for the period 2003 to 2008, which is the period commencing with the proposed on-line date of the Project and ending the last year covered by the 1999 Regional Plan (the "Study Period"). This information is shown for three different cases:

1. Case 1: This case is based on the information contained in the 1999 Regional Plan.
2. Case 2: This case is also based on the 1999 Regional Plan, but includes the additional Committed Resources summarized in Exhibit PAA-3, less the capacity associated with the Projects, and less the Uncommitted Resources, also summarized in Exhibit PAA-3.
3. Case 3: This case is the same as above, but includes the Projects.

The information in this exhibit was prepared generally using the format shown on page 22 in the 1999 Regional Plan.

Q. IS EXHIBIT PAA-6 SIMILAR TO EXHIBIT PAA-5, EXCEPT THAT IN PREPARING EXHIBIT PAA-6 YOU USED WINTER CAPACITY RATINGS AND WINTER LOAD PROJECTION DATA IN PLACE OF SUMMER CAPACITY RATINGS AND SUMMER LOAD PROJECTIONS?

A. Yes.

Q. ARE MERCHANT PLANTS RECOGNIZED IN THE RESERVE MARGIN

CALCULATIONS?

A. The treatment of merchant plants and other purchased power is addressed in FPSC Rule 25-6.035 which states:

> "Only firm power agreements may be included as a resource for purposes of calculating planned or operating reserve margin. A utility may petition for waiver of this requirement based on the very high availability of specific non-firm purchases."

Also, Order PSC-99-2507-S-EU issued December 22, 1999, Docket No. 98189-EU, in re: Generic Investigation into the aggregate electric utility reserve margins planned for peninsular Florida, which refers to the calculation of reserve margin by IOU's, states in part:

> "Total firm capacity will be based on generating capacity owned by the IOU's or capacity from which there is a firm commitment to these IOU's..."

IOU's are defined as Florida Power & Light Company ("FPL"), Florida Power Corporation ("FPC"), and Tampa Electric Company ("TECO").

Q. WITH REGARD TO FPSC RULE 25-6.035, HOW IS THE TERM "VERY HIGH AVAILABILITY" DEFINED?

A. That term is not defined.

Q. WOULD THE MERCHANT PLANT BE REPORTED BY A UTILITY AS A FIRM RESOURCE?

A. If the price offered by Panda Leesburg for output from the Project is competitive with other potential generating alternatives, there is no reason to believe utilities in the FRCC would not enter into firm contracts to purchase the output of the Project. Also, as previously stated in FPSC Rule 25-6.035, utilities may petition for a waiver of the

requirement to have a firm contract based on the very high availability of specific non-firm resources.

Q. WHY WOULD THE MERCHANT PLANT DEVELOPER NOT SELL ITS OUTPUT OUTSIDE THE FRCC?

A. To transport power out of the FRCC, into the Southeastern Electric Reliability Council ("SERC") for example, additional transmission charges and losses would be incurred. With the added wheeling costs and losses to transport capacity and energy out of the FRCC, it is more likely that the capacity and energy will be sold to utilities within the FRCC. Based on our regional dispatch analysis we project that 98% of the energy from the Project will be sold in the FRCC over every year evaluated.

Q. WHAT OBSERVATIONS DID YOU DERIVE FROM YOUR REVIEW OF EXHIBIT PAA – 5 AND EXHIBIT PAA – 6?

A. I have several observations:

1. The generating capacity reserve margins in peninsular Florida with load management and interruptible capabilities, as reported in the 1999 Regional Plan, (Case 1, Exhibit PAA-5 and Exhibit PAA-6), are projected to range between 20% to 17% over the Study Period at the time of the summer peak demand and between 19% and 18% during the time of the winter peak demand. These projected amounts, taken from a document that was prepared in the spring of 1999, are lower that the minimum reserve margin planning criteria of 20 percent which FPL, FPC and TECO have adopted in the previously mentioned Docket No. 981890-EU.
2. The generating capacity reserve margins with load management and interruptible

capabilities in peninsular Florida, less Uncommitted Resources, plus additional Committed Resources and excluding the Projects (Case 2, Exhibit PAA-5 and Exhibit PAA-6), are projected to range between 27% and 12% over the period 2003 through 2008 at the time of the summer peak demand and between 24% and 13% during the time of the winter peak demand.

3. The generating capacity reserve margins in peninsular Florida with load management and interruptible capabilities, less Uncommitted Resources, plus additional Committed Resources including the Projects, Case 3, Exhibit PAA-5 and Exhibit PAA-6, are projected to range between 33% and 18% over the period 2003 through 2008 at the time of the summer peak demand and between 30% and 18% during the time of the winter peak demand.

Q. WHAT CONCLUSIONS CAN YOU DRAW FROM EXHIBIT PAA-5 AND EXHIBIT PAA–6?

A. Even taking into account load management and interruptible capabilities, the summer and winter reserve margins are projected to fall below the 20 percent level without the Project by the winter of 2005/2006.

Q. IF THE UTILITIES IN FLORIDA HAVE PLANS IN PLACE TO MEET THE CAPACITY NEEDS OF THE FRCC THROUGH 2008, WHY IS THERE A NEED FOR THE PROJECTS?

A. As previously discussed many of the planned projects in the 1999 Regional Plan are uncommitted projects in the early planning stages. Panda is willing to commit now to build generating projects that will be needed according to the 1999 Regional Plan by

the winter of 2005/2006. Having additional projected reserves during the year 2003 through the summer of 2005 will also be beneficial to the FRCC since historically, actual peak demands in the FRCC have generally been higher than predicted in previous FRCC regional planning documents. Since Panda will be financing this project and placing no financial commitment on Florida rate payers, these additional reserves will not place an additional financial burden on Florida rate payers.

Q. HOW DID YOU EVALUATE THE COST EFFECTIVENESS OF THE PROJECT?

A. The cost effectiveness of the Project was evaluated in two ways. First, I prepared a generic screening type comparison of the projected costs of combined cycle technologies (the technology used by the Project) to other major commercially-available generating technologies. The first method did not use specific information about the Project. Second, I compared the reported costs and efficiency of the Project to other generating projects planned or proposed by others.

Q. WITH REGARD TO THE FIRST METHODOLOGY, WHAT COSTS WERE CONSIDERED?

A. The first methodology involved a comparison of total "all-in," levelized life cycle costs. These costs include projected capital, fuel, non-fuel O&M, and readily-quantifiable costs associated with environmental compliance. The costs, which were adjusted for inflation to year 2000 dollars, were levelized over the useful life of each type resource using the levelization methodology that is described in the Electric Power Research Institute ("EPRI") "*Technical Assessment Guide, Electric Supply*

1993" ("TAG"). The levelized costs were calculated for various assumed capacity factors, including 10 percent, 50 percent, and 90 percent, to represent the peaking, intermediate, and base load usage categories of resources.

Q. WHAT WERE THE SOURCES OF THE COST DATA USED IN DEVELOPING THE COST PROJECTIONS FOR THE VARIOUS GENERATING TECHNOLOGIES?

A. The data used in the analysis was based on information from publicly-available sources including the "*Market Based Advanced Coal Power System Report*" dated May 1999 from the U.S. Department of Energy ("DOE"), "*Renewable Energy Technology Characterizations*" dated December 1997, a joint project of the office of Power Technologies, Energy Efficiency and Renewable Energy, DOE, and the EPRI, "*Gas Turbine World Handbook*" (1999-2000), "*1996 Energy Technology Status Report*" from the California Energy Commission as reported in Kissimmee Utility Authority's Need for Power Application, Georgia Power Company's 1998 Integrated Resource Plan, Title V air permits in Florida from year 2000 applications, and the Federal Energy Regulatory Commission's ("FERC") 1998 Form 1's.

Q. PLEASE EXPLAIN EXHIBIT PAA-7.

A. Lines 1 thorough 12 contain the various financial/economic assumptions used for the generic screening process. The interest rates, return on equity and debt/equity rates are representative of merchant plants. Investor owned utilities typically would have a higher debt/equity ratio (i.e., higher percentage debt). Information about various generation technologies is shown on lines 13 through 49. Columns (a) through (l)

includes technical and cost data for each type resource. Column (m) contains the estimated fixed carrying charge for each generating resource. Column (n) through (p) indicate the levelized cost at assumed capacity factors of 10%, 50% and 90%, respectively. These results are summarized below.

Comparison of Generation Alternatives			
Type of Technology	Levelized Cost (2000 $/MWh)		
	Peaking (10% CF)	Intermediate (50% CF)	Base Load (90% CF)
Steam – Coal	N/A	52-59	35-42
Integrated Gasified Combined Cycle ("IGCC")	N/A	53-61	33-40
Steam Gas	124	53	45
Nuclear	N/A	61	36
Renewable Energy	121-1,072	67-240	47-147
Combined Cycle – Gas	90-108	37-45	30-37
Combined Cycle – Oil	103-124	50-61	43-53
Combustion Turbine –Gas	85-116	52-73	45-68
Combustion Turbine – Oil	109-144	71-101	64-97

Q. IN THE SCREENING ANALYSIS, DID YOU COMPARE THE COST EFFECTIVENESS OF THE PROJECT TO A SIMILAR PLANT BUILT BY AN ENTITY WITH A DIFFERENT FINANCIAL STRUCTURE?

A. No. In the screening analysis, the same financial assumptions were used for all generating alternatives. The purpose of this analysis was to show that the chosen technology type, combined cycle generation, was the most cost-effective technology for new generation.

Q. WOULD A REGULATED COST-BASED PLANT BE MORE COST EFFECTIVE THAN A MERCHANT PLANT?

A. No, not necessarily. No utility or retail customer is obligated to purchase the output of a merchant plant; therefore, if an owner of a merchant plant wants to sell the output

from its generating resource, its price must remain competitive with other available generating and purchase power alternatives, including utility self-build options.

Q. WHAT WERE THE RESULTS OF THE SCREENING TYPE ANALYSIS?

A. The results, which are contained in Exhibit PAA-7 and summarized below, indicate that the gas-fired combined cycle is generally the lowest cost technology in the base load and intermediate load categories, which is the intended use of the Project.

Only the IGCC technology and steam nuclear had levelized costs which fall within the range of combined cycle technology costs in the base load category. Only the simple cycle gas-fired combustion turbine technology had lower levelized costs in the peaking category. The IGCC and nuclear technologies represent a significantly greater investment per kW than the combined cycle or simple cycle combustion turbine. Also, nuclear technologies have environmental issues and other risks related to decommissioning costs and fuel disposal.

In comparison to other economical technologies, the gas-fired combined cycle units and simple cycle combustion turbine units are projected to have some of the lowest air emissions even without selective catalytic reduction ("SCR") emission control equipment.

When all these factors are considered, the combined cycle technology is projected to be the most cost effective technology for base load and intermediate load use and the simple cycle combustion turbine technology is projected to be the most cost effective technology for peaking load use when compared to the other commercially available generating technologies included in the generic screening. This is not surprising, since most new electric generating resources currently being

planned and built are either gas-fired combined cycle or simple cycle combustion turbine generating units.

Q. WHAT WAS THE SECOND METHODOLOGY USED IN EVALUATING THE COST EFFECTIVENESS OF THE PROJECT?

A. The second methodology involved comparing the Project to other Committed Resources that are projected to be placed in service during the period covered by the 1999 Regional Plan. A summary of these Committed Resources is presented on Exhibit PAA-8.

Q. WHAT WAS THE SOURCE OF THE INFORMATION INCLUDED ON EXHIBIT PAA-8?

A. The information was based on the respective need determination filings and the Ten-Year Site Plans of the utilities associated with the Committed Resources identified.

Q. WHAT DID YOU CONCLUDE FROM YOUR COMPARISONS OF OTHER COMMITTED RESOURCES TO THE PROJECTS, AS SHOWN ON EXHIBIT PAA-8?

A. The projected direct construction costs and efficiency of the Project compares favorably to other Committed gas-fired, combined cycle generating units planned or proposed by other utilities in the FRCC. Only the Cane Island Unit 3, a joint project of the Florida Municipal Power Agency and the Kissimmee Utility Authority, the Duke New Smyrna Project, the PG&E Okeechobee Project, and the Seminole Electric Cooperative, Inc. Hardee 3 Project are expected to have direct construction costs (on a

dollar per kW basis) and heat rates that are comparable to the Project. The other combined cycle power plants and repowering projects that have comparable efficiencies with the Project reflect higher direct construction costs on a dollar per kW basis.

Q. DID YOU PERFORM AN EVALUATION TO DETERMINE WHETHER THE PROJECT WOULD HAVE A BENEFICIAL IMPACT ON WHOLESALE ELECTRIC ENERGY PRICES IN THE FRCC?

A. Yes, as Mr. Davis will discuss in further detail, we have performed an evaluation projecting that wholesale electric energy prices in the FRCC will be reduced as a result of the Project.

Q. PLEASE EXPLAIN THE METHODOLOGY YOU HAVE USED TO ARRIVE AT THAT RESULT.

A. We evaluated two sets of cases (four cases in all), both of which indicated that the Project would result in a projected reduction in wholesale electric energy costs in the FRCC. The first set of cases (two cases), the Basic Analysis, assumes that only existing and Committed Resources are installed over the period 2003 through 2008 (the period commencing with the proposed on-line dates of the Projects through the end of the period reported in the 1999 Regional Plan). One case includes the Projects, and the other case excludes the Projects. Each case involves a generation production cost simulation that projects the total energy-related cost of producing electricity at the generation level within the FRCC assuming an FRCC-wide dispatch. The difference in total annual energy costs for the FRCC between the two cases represents the impact on

total wholesale electric energy costs associated with adding the Projects to the FRCC. The projected benefits per Project were estimated as one-half of the total cost difference associated with both Projects.

Q. WHO WILL BENEFIT FROM THESE REDUCED WHOLESALE ENERGY COSTS?

A. The wholesale energy cost reduction which has been projected represents the total potential energy cost benefit resulting from the Project. This benefit will be shared in some manner between the merchant plant owner, who receives part of the benefit through profits, and buyers in the wholesale energy market in peninsular Florida, who enjoy part of the benefit through reduced prices. It should also be noted that no capacity benefits were taken into account in Mr. Davis' economic evaluation. To the extent capacity benefits are also considered there would be a greater potential benefit to be shared by participants in the wholesale electric energy market.

Q. WHY WERE ONLY ENERGY-RELATED COST DIFFERENCES EVALUATED IN YOUR ANALYSIS?

A. Only the energy-related cost differences were evaluated since there is no obligation by any utility or retail customer to pay a merchant plant owner for the output of the plant and there is no guarantee that the merchant plant owner will recover capacity related costs. It was assumed that the Project would recover energy-related costs for the following reasons. If Panda Leesburg were to sell the output from the Project as a merchant plant, energy from the Project would be made available to the wholesale market and dispatched based on the price of energy in the market. In general, the

merchant plant would only be dispatched if the merchant plant owner can recover at a minimum the plant's fuel and other variable related operating costs, i.e., its energy-related costs. Otherwise, it would not be dispatched.

Q. WOULD A MERCHANT PLANT OWNER EXPECT TO RECOVER THE FIXED COSTS ASSOCIATED WITH CONSTRUCTING AND OPERATING THE PLANT?

A. Yes, the merchant owner expects to recover these costs, but as a merchant plant there is no obligation by any utility or retail customer to make these payments. If there is no firm contract with a utility, the merchant plant owner will recover energy revenues only. The amount by which energy revenues are greater than the merchant plant owner's energy costs, if any, will be used to pay the owner's fixed costs and return.

Q. WILL THE MERCHANT PLANT OWNER RECOVER A RETURN ON INVESTMENT THAT SUBSTANTIALLY EXCEEDS WHAT A COST-BASED REGULATED FLORIDA UTILITY WILL RECEIVE?

A. Not necessarily. The merchant plant developer will be subject to competitive pressures to keep its wholesale costs as low or lower than other wholesale providers. Otherwise it will not be able to sell its energy and/or capacity. The price the merchant plant recovers will be set by the market. Its return will be based upon the market revenues it receives less its operating cost and debt service. This resulting return over any given period may be higher or lower than a regulated return, depending on the market. It should also be noted that while most utilities in Florida have a fuel adjustment clause, the merchant plant does not. The merchant plant must absorb above market fuel costs

by accepting a lower return on equity since the total revenues it receives are capped by what buyers are willing to pay in a competitive market. This is another reason why a merchant plant owner's return may not exceed a cost-based regulated utility. The converse is also possible.

Q. IF EVERY MERCHANT PLANT, BY ITS NATURE, REPRESENTS A REDUCTION IN WHOLESALE ELECTRICITY PRICES IN PENINSULAR FLORIDA, DOES THIS MEAN THAT THERE IS NO LIMIT TO HOW MANY MERCHANT PLANTS WILL BE BUILT?

A. No. As I previously stated, each merchant plant represents some energy savings, which can be utilized to the extent allowed by the market to offset fixed capital-related and operating costs. For a given load level, as each successive increment of generation is added, the incremental energy savings are reduced, and the potential return to future merchant plant owners becomes less attractive. This economic mechanism is expected to limit the number of merchant plants in peninsular Florida.

Q. WHY DID YOU ONLY INCLUDE EXISTING AND COMMITTED RESOURCES IN THE FIRST SET OF CASES?

A. The purpose was to estimate the impact on wholesale electricity energy prices associated with the next increment of generation in the FRCC, the Panda Projects. In order to evaluate the impact on wholesale electric energy prices associated with the next increment of generation, I believe that the Basic Analysis should only model Committed Resources. In this manner the next increment of generation is dispatched against all existing and Committed Resources, and any savings will result from the

next increment of generation displacing more expensive resources that either exist or are likely to be installed in the FRCC. Each successive project should show that it could dispatch against previously installed or Committed Resources.

Q. WHY WERE UNCOMMITTED RESOURCES NOT INCLUDED IN THE FIRST SET OF CASES?

A. There are a number of Uncommitted Resources both contained in the 1999 Regional Plan and announced by developers. These resources may be delayed or never built. I do not believe these Uncommitted Resources are relevant in evaluating the impact of the next increment of generation on wholesale electric energy prices.

Q. WHAT WAS THE SECOND SET OF CASES YOU EVALUATED?

A. The second set of cases, the Alternative Analysis assumes that generating units similar to the Projects are added in the future, after the Projects, to maintain a 20 percent reserve margin.

Q. IF YOU DO NOT BELIEVE THE UNCOMMITTED RESOURCES ARE RELEVANT WHY DID YOU PREPARE THE ALTERNATIVE ANALYSIS?

A. The Alternative Analysis was developed as a Sensitivity Case or a "what-if" scenario to represent a lower range or more conservative projection of wholesale electricity energy savings.

Q. WHY DOES THE ADDITION OF FUTURE UNITS, SIMILAR TO THE PROJECTS, AND AT LEVELS SUFFICIENT TO MAINTAIN A 20 PERCENT

RESERVE MARGIN, REFLECT A CONSERVATIVE OR LOWER PROJECTION FOR WHOLESALE ELECTRIC ENERGY SAVINGS IN THE FRCC?

A. By taking into account the effects of potential future units added after the Project, the apparent economic benefits of the Project tend to be diluted, so to speak. When the Project is added to the system and economically dispatched, the operation of generating resources that are more expensive than the Project is displaced by the lower cost Project energy, hence producing energy cost and fuel use savings. With each incremental addition of combined cycle capacity similar to the Project, output from more expensive resources is reduced further still. However, because the "avoidable" costs associated with less efficient resources is reduced with each incremental efficient combined cycle addition and because the savings attributable to the Project and the additional combined cycles are shared due to their similar cost and efficiency, the incremental benefit attributable to the Project is less and, therefore, more conservative when modeled with the additional combined cycle resources.

Moreover, by assuming all of the future units added after the Project are efficient combined cycle units like the Project instead of a mix of combined cycle and peaking units, which have higher energy costs than combined cycle units and the Project, the projected reduction in wholesale electric energy costs associated with the Projects is expected to have further built-in conservatism.

Q. WHAT WERE THE RESULTS OF THE BASIC ANALYSIS AND THE ALTERNATIVE ANALYSIS?

A. Mr. Davis will discuss the details of the Beck Analysis, but in summary, the Project is

projected to have the effect of reducing wholesale energy costs in the FRCC on the average of $47 million to $48 million dollars per year per Project over the period 2004 through 2008. (See Exhibit RLD-3.) The higher of these projected annual benefits results from the Basic Analysis and the lower of these annual average projected benefits results from the more conservative Alternative Analysis.

Q. WHAT ARE THE CONSEQUENCES OF DELAYING THE PROJECTS?

A. The consequences of delay can generally be categorized with respect to reliability, power supply costs and environmental impacts.

Q. WHAT ARE THE CONSEQUENCES WITH RESPECT TO RELIABILITY?

A. The Projects are reported by Panda Leesburg to have availabilities of 94 percent. Even assuming a 93 percent availability, which is a level of reliability typically experienced by merchant plant combined cycle resources like the Project, the Project is expected to contribute to the reserve margin and reliability of the peninsular power supply system. Exhibit PAA-5 and Exhibit PAA-6 show that the Project will improve peninsular Florida's summer and winter reserve margins by approximately 2.9 to 2.7 percent each beginning with the Project's in-service date in 2003 and continuing throughout the period covered by the 1999 Regional Plan.

The presence of additional capacity (1,100 MW summer and 1,150 MW winter) will improve reliability and reduce peninsular Florida's exposure to outages due to extreme weather or unanticipated events such as major generation outages. If the Project is not constructed and brought into commercial operation in 2003 as planned and sought by Panda Leesburg, these reliability benefits will be lost and

peninsular Florida electric customers will be exposed to a greater probability of service interruption than they would experience if the Project was built as planned.

Q. WHAT ARE THE POWER SUPPLY COST CONSEQUENCES OF DELAY?

A. Assuming an efficient heat rate of approximately 7,000 Btu/kWh, which is typical for the combined cycle technology utilized by the Project, it is projected that wholesale electric energy costs in the FRCC will be reduced with the addition of the Project. This is projected to be the simple economic result of an increase in efficient generation displacing higher cost resources and imported energy. If the Project is not constructed and brought into commercial operation in 2003 as planned and sought by Panda Leesburg, these economic benefits will be lost and wholesale electric energy costs in peninsular Florida will be higher than if the Project was built.

Q. WHAT ARE THE ENVIRONMENTAL CONSEQUENCES OF DELAY?

A. Because of the Project's high efficiency and natural gas fuel supply, the Project will have a relatively benign environmental profile. For example, average oil-fired generators, operating in Florida have SO_2 emissions levels of approximately 12 lbs. per MWh; whereas, gas fired units in Florida have SO_2 levels of approximately 0.5 lbs. per MWh. With respect to NO_X, average oil fired units have NO_X levels of approximately 4 lbs. per MWh; whereas, average gas-fired units have averaged approximately 1.3 lbs. per MWh. The Project will displace production from older, less efficient and generally more pollution-intensive power plants (e.g., less efficient steam and combined cycle generating plants fired by oil or natural gas and combustion turbine plants fired by oil or natural gas). This displacement will result in savings in

primary fuel consumption for electricity generation and will also result in reduced environmental emissions from power production in Florida.

Based on the projected dispatch of the Project and other generation resources within the FRCC, the overall environmental profile of electricity generation in FRCC is expected to improve. The Project's output is projected to displace generation using heavy fuel oil, light fuel oil and natural gas. Reductions in light and heavy oil will result in reductions in emissions of sulfur dioxide, nitrogen oxide, particulate matter and carbon monoxide. Even when the Project displaces gas-fired generation, there will still be reductions in emissions due to the Project's more efficient use of natural gas caused by the more efficient heat rate of the Project.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes it does.

Professional Resume of Paul A. Arsuaga

EDUCATIONAL BACKGROUND:

Bachelor of Science Degree in Electrical Engineering
Tulane University. New Orleans, Louisiana, June, 1969

Masters Degree in Business Administration
University of Hawaii. Honolulu, Hawaii, August, 1975

PROFESSIONAL REGISTRATION:

Registered as a Professional Engineer in the States of Florida, Mississippi and Missouri.

EXPERIENCE:

1999-Present	Principal in the firm of R. W. Beck/R. W. Beck, Inc.
1981-1999	Mr. Arsuaga, has been an employee with R. W. Beck, Inc. where his work involved planning electric power facilities. Since joining the Firm in 1981, he has prepared or supervised studies and reports which include numerous market price assessments, independent engineering reviews, evaluation of stranded costs, power supply studies for municipal utilities and joint action agencies, consulting engineer's reports for official statements, financial analyses, acquisitions, damage studies, and power purchase contract negotiations.
1977 - 1981	Employed by Kansas City Power and Light Company. Served as a corporate planning engineer for which he performed generation planning studies and managed a corporate model.
1969-1977	Communications Planning Officer in the United States Air Force. Planned ground and tactical communications – electronic systems for the Air Force. This work involved economic evaluations relating to telephones, microwave and other types of telecommunications systems.

RELEVANT EXPERTISE

WHOLESALE POWER SUPPLY CONTRACTS AND NEGOTIATION

Mr. Arsuaga has been involved with evaluating wholesale power contracts for the Municipal Energy Agency of Mississippi; the City of St. Cloud, Florida; Alabama Municipal Electric Authority; and the Florida Municipal Power Agency.

Mr. Arsuaga has been involved with developing an appropriate methodology for compensating members of a joint action agency for supplying power supply resources to an all-requirements project.

Mr. Arsuaga has been involved in developing stranded cost analyses for two different joint action agencies.

Mr. Arsuaga has been involved in directing a hold harmless analysis to determine the potential rate impact and hold harmless costs associated with making remaining members of a joint action agency of Mississippi whole after certain members terminate their power supply arrangements.

PLANNING FOR ELECTRIC UTILITY RESTRUCTURING

Mr. Arsuaga has directed two recent analyses for industrial clients relating to assisting them making capital decisions in a deregulated environment. This work involved developing scenarios for long-range sustainable pricing practices in a deregulated electric utility market for generation. It also involved preparing projections of both time-of-day marginal costs and market clearing prices for various market regions of the United States based on these pricing practices. These analyses take into account transmission import and export capabilities between market areas, load and resources in several NERC reliability regions, annual economic conditions, market behavior, reliability standards and other factors.

Mr. Arsuaga was also recently involved in assisting a joint action agency with its input to the Public Service Commission staff's Proposed Transition Plan for Retail Competition in the Electric Industry, and in this capacity, has met with the staff to discuss restructuring.

MARKET PRICE ANALYSES

Mr. Arsuaga has supervised numerous projects involving the preparation and/or review of market price projections for both industrial and joint action agency clients. These projections have been prepared for four market regions in different NERC regions. Some of these projects have included developing and using various computer models of electric utility market regions to simulate various market pricing structures under a market based restructured electric utility environment. He has also reviewed and evaluated numerous market price projections prepared by other consultants as part of independent engineering reviews and work related to rate filings for stranded costs. Mr. Arsuaga is a member of the Firm's Market Pricing Task Force through which he has been involved in understanding, evaluating and communicating issues related to market pricing in the electric utility industry.

ELECTRIC POWER RESOURCE PLANNING

Mr. Arsuaga has an extensive background in preparing electric resource planning studies for municipal utilities and joint action agencies. He has either prepared or directed the preparation of electric resource planning studies for the Florida Municipal Power Agency ("FMPA"), the Municipal Energy Agency of Mississippi ("MEAM"), the Bahamas Electricity Corporation ("BEC"), the City of Tallahassee, Florida, the Utility Board of the City of Key West, Florida, the Sebring Utilities Commission, the Fort Pierce Utilities Authority, the City of Vero Beach, Florida, and a large improvement district. These studies, which make conclusions and recommendations regarding the client's participation in specific power supply projects, have included screening type analyses which focus on identifying a list of reasonably attainable potential alternatives, as well as comprehensive studies which cover power supply related areas such as load forecasts, reliability, environmental impact, economic/financial feasibility, bond requirements, rate impact, and risk analysis.

Mr. Arsuaga's studies have been utilized by clients in making decisions regarding numerous purchased power arrangements. The following are examples of some projects associated with Mr.

Arsuaga's power supply studies: MEAM was organized to provide lower cost power to municipal participants in eastern Mississippi; Mr. Arsuaga conducted an RFP process which lowered the electricity costs to the City of Hagerstown, MD and three other municipals by 15 percent.

REQUEST FOR PROPOSAL SERVICES

Mr. Arsuaga has been a lead team member or project manager on power supply solicitations involving the City of Tallahassee; the Florida Municipal Power Agency; City of Hagerstown, MD; the Alabama Municipal Electric Authority; the City of St. Cloud, Florida; Golden Spread Electric Cooperative, Inc. and the Municipal Energy Agency of Mississippi. This process included preparation of the Request for Proposal and evaluation manual, evaluation of the proposals and negotiations with the potential power suppliers. Mr. Arsuaga has also participated in meetings and discussions with state public commission staff's in Florida and Texas, and has testified in a Public Utility Commission Hearing relative to the RFP Process.

RELIABILITY STUDIES

Mr. Arsuaga has been involved in evaluating electric system reliability and determining reliability criteria for electric utilities. These studies have involved estimating various measures of reliability, such as loss of load probability (LOLP), loss of load hours (LOLH), and expected unserved energy (EUE) for isolated and interconnected power systems. He prepared a reliability study for the City of Tallahassee, Florida that involves modeling the reliability of the electric system including peninsular Florida and Georgia.

LITIGATION SUPPORT

Mr. Arsuaga has been involved in litigation support services associated with wholesale electric rate filings, territorial disputes, and damage studies.

He has prepared analyses and testimony for Case No. 87-00103 CIV before the U.S. District Court Southern District of Florida, Miami Division, City of Homestead vs. Imo Delaval and Transamerica Corporation, which was amicably settled. He has also prepared analyses and testimony in cases for the Municipal Electric Authority of Georgia, the City of Tallahassee FMPA, the Municipal Energy Agency of Mississippi and industrial clients relating to wholesale power costs, territorial issues and transmission access and deregulation issues.

Mr. Arsuaga has testified before the Florida Public Service Commission with regard to territorial issues involving the Fort Pierce Utilities Authority and Florida Power & Light; before the Public Utility Commission of Texas with regard to the selection of resources through an RFP.

FINANCIAL PLANNING AND ANALYSIS

Mr. Arsuaga has been involved with the preparation of numerous official statements for bond refunds, and the financing of new electric generation facilities including the North Carolina Eastern Municipal Power Agency ("NCEMPA"), the Utility Board of the City of Key West, the Florida Municipal Power Agency ("FMPA"), the Municipal Energy Agency of Mississippi ("MEAM"), the Municipal Electric Authority of Georgia ("MEAG"), and the City of Tallahassee. Mr. Arsuaga has also assisted financial institutions with the evaluation of a merchant generation project in California; Arizona; Nevada; Texas; Mississippi; and Alberta, Canada. Mr. Arsuaga's experience has enabled him to analyze the financial aspects of municipal projects including proforma results, adequacy of liquidated damages, bond indenture requirements, various financing methodologies, tax-exemption considerations, arbitrage and other financial related factors.

GAS FUEL SUPPLY

Mr. Arsuaga has performed various studies relating to gas fuel supply for Florida municipals to determine the most economic level of firm gas service and the most economic mix of firm transportation versus firm service with the Florida Gas Transmission Company ("FGT"). The analysis involved projecting the daily gas usage for the cities electric production facilities and determining the level of firm gas transportation and firm service that represented the lowest cost — taking into account the cost of generating on alternative fuels, potential curtailments of interruptible gas, and take or pay gas supply charges. The Authority and City based nominations for FGT's Phase II and III gas pipeline expansions on these analyses.

COMPETITIVE ANALYSES, MERGERS AND ACQUISITIONS

Mr. Arsuaga has performed analyses associated with determining the economic benefits of mergers and acquisitions for electric utilities. One such analysis evaluated the impact of acquiring an additional service territory for a municipal utility. This analysis, which was submitted to the Florida Public Service Commission, indicated the impact on the municipal utility's existing and transferred customers of the proposed acquisition of an additional service territory.

Another analysis evaluated the impact on a municipal utility's customers of a proposed transfer and acquisition of service territories and associated customer accounts between the municipal utility and Florida Power & Light. This analysis included an evaluation of equipment value, incremental and decremental revenues, and potential load growth for the areas involved.

Mr. Arsuaga performed an evaluation for a municipal utility to address potential future events such as the commencement of purchased power contracts for which the City is committed, power supply sales, acquiring additional territory, and potential changes in administration costs.

TRAINING AND INFORMATION PRESENTATIONS

Mr. Arsuaga has made numerous presentations before utility boards and city commissions relating to electric resource planning and was a guest lecturer on Integrated Resource Planning in an IEEE Power Generation Seminar lecture series. He prepared technical papers on the RFP process, and determining the market value of generation capacity in a deregulated utility environment, which were presented at technical conferences.

SELECTED CONSULTING EXPERIENCE

The Coalition for Choice in Electricity (CCE) – Evaluating analysis performed by witnesses for FirstEnergy Corporation and American Electric Power regarding generating asset evaluation and the impact of a new electric industry restructuring law on the company (2000).

Calpine Energy – Independent engineering reviews of six different merchant plant combined cycle projects for financial institutions to support financing (1999-2000).

Joint Action Agency – Prepared stranded cost analysis of generation resources and contracts (1999).

Major Generation Developer – Prepared a power market assessment of the FRCC to determine economic feasibility of new merchant plant generation (1999).

ATCO Power Canada – Evaluated market price projections and methodology by another consultant as part of an independent engineering review of a merchant plant generation project in Canada (1999).

Major Industrial Clients – Prepared market price projections to assist two different industrial clients with making capital decisions in a deregulated electric utility market (1998-1999).

Municipal Energy Agency of Mississippi – Assisted the Municipal Energy Agency of Mississippi with its input to the Mississippi Public Service Commission Staff's proposed Transition Plan for Retail Competition in the Electric Utility Industry (1998).

L.S. Power – Independent engineering review of a merchant plant combined cycle project for financial institutions to support financing (1998).

Municipal Energy Agency of Mississippi – Request for Proposal preparation and evaluations of power supply alternatives to replace existing arrangements (1997-1998).

City of Hagerstown, Maryland – Conducted a power supply solicitation which included the evaluation, solicitation and negotiation of power supply alternatives (1997-1998).

Golden Spread Electric Cooperative, Inc. – Conducted power supply solicitation, evaluated power supply solicitation, evaluated proposals, and testified at the Public Utility Commission hearing in support of certificate of need for an exempt wholesale generator ("EWG") combined cycle project (1995-1996).

City of St. Cloud, Florida – Project manager on power supply solicitation and negotiations for replacing the City's power supply arrangements to be more competitive (1995).

City of Tallahassee – Conducted a reliability study for the City of Tallahassee to determine expected unserved energy (EUE), loss of load probability (LOLP), taking into account interconnections with other utilities (1995).

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

Arsuaga, P. A. and Stein, S. - *"Using the Request for Proposal for Procuring Electric Resources in Today's Competitive Environment,"* International Joint Power Generation Conference and Exposition, Denver, Colorado, November 5, 1997

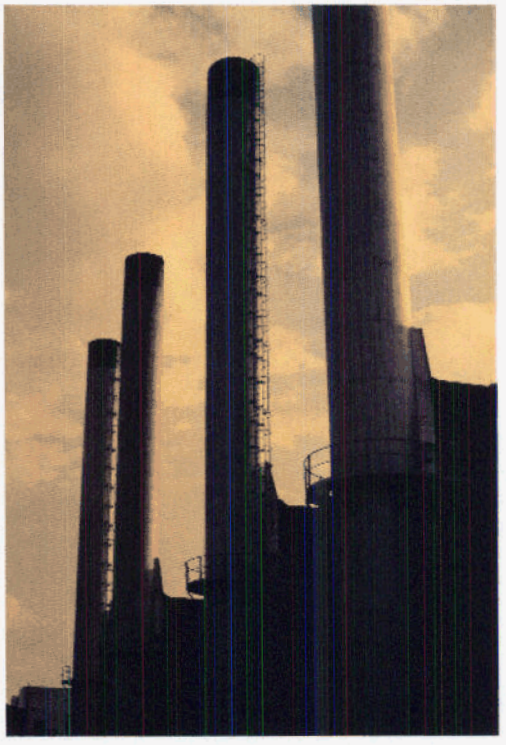
Arsuaga, P. A. – *"Integrated Resource Planning"* Guest lecturer in an IEEE Power Generation Seminar Lecture Series 1992.

RECORD OF TESTIMONY

Regulatory or Judicial Forum	Proceeding	Petitioner/Matter	Client	Subject of Testimony	Date
Public Utility Commission, 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	1996
Florida Public Service Commission	Docket No. 891245-EU, 1992	Fort Pierce Utilities Authority/ Florida Power & Light	Fort Pierce Utilities Authority	Generation Capacity Adequacy relating to a change in service territory	1992

FPSC Docket No. 000288-EU
Panda Leesburg: Arsuaga
Exhibit (PAA-2)

Statement of Qualifications
R. W. Beck, Inc.



April 2000

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Section 1

FIRM OVERVIEW

R. W. Beck, Inc. is one of the nation's leading consulting engineering firms serving the independent power industry, developers, financial community, utility organizations, and several branches of government.

The firm was founded in 1942 and provides professional engineering and consulting services in planning, financing, operating, and designing facilities for electric, water, wastewater, gas and solid waste utilities. We provide professional services throughout the United States and in a number of foreign countries, and have served some of our clients on a continuous basis for over 50 years. The firm has had an office in Orlando, Florida since 1965. A map of our office locations is included below.

The firm offers total engineering and analytical services. These services extend from initial planning through the steps of negotiating contracts, determining engineering and economic feasibility, project financing, design, construction engineering, personnel training, operations and maintenance, and follow-up consultation to management.

We have grown to meet client needs driven by the constraints and opportunities associated with technology advancements, regulatory requirements, legislative initiatives, economic conditions and other world events shaping the utility and energy industries.

R. W. Beck's global infrastructure experience spans four continents and encompasses projects worth a total of more than $150 billion. Highlights of our qualifications include assignments where we have:

- Conducted market assessments, risk analyses and mitigation studies; determined stranded investment exposure; reviewed and commented on legislative and regulatory policies; provided expert testimony associated with restructuring, and developed strategic alliances (pooling) to help clients take advantage of a changing utility environment.
- Reviewed and monitored over 400 power, cogeneration, or industrial projects in over 25 countries for more than 70 different financial institutions, involving over 60 different project owners. These projects cover the full range of fuels and technologies that have been commonly employed in cogeneration, small power, resource recovery, and alternative energy projects developed, built, and operated domestically and internationally during the last decade.

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FIRM OVERVIEW

- Prepared independent Consulting Engineer's Reports used in the financing of billions of dollars of privately and publicly funded projects. These reports are prepared exclusively for the clients' use in official statements and include evaluations of the financial, economic, technical, and environmental conditions of the project being funded.
- Permitted and licensed power plants, resource recovery facilities and industrial sites in 42 states and several U.S. territories, including Guam and the U.S. Virgin Islands.
- Participated in negotiations of power arrangements for firm and non-firm, market and cost-of-service priced, partial and full requirements, and wholesale and retail transactions for both utility and non-utility clients, as well as most of the investor-owned utilities in the southeast.
- Planned, engineered, or provided construction management for thousands of miles of high-voltage transmission lines and substation siting in North and South America.

Our reputation as a multidisciplinary consulting engineering firm rests solidly on the background and experience of our engineers and other staff. It is based also on our ability to apply our expertise to changing client needs and market conditions.

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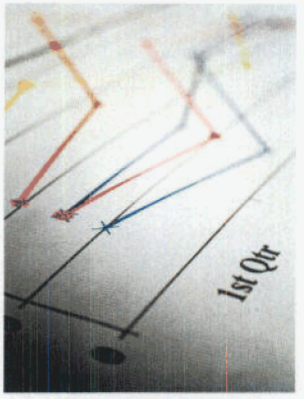
Section 2

REGIONAL MODELING AND POWER MARKET ASSESSMENT EXPERIENCE



INTRODUCTION

As markets for power and gas become increasingly competitive, the ability of electric and natural gas utilities and large end-use customers to accurately assess their competitive positions and business opportunities through forecasts of market clearing prices for electric power will become of paramount importance. R. W. Beck possesses the knowledge, tools and experience required to assist its clients in developing market price forecasts that reflect the realities of this rapidly changing marketplace.

R. W. Beck has been performing sophisticated modeling of the long-term projected market price for power in various regions of North America under the evolving market structures of competition. Within the last two years, we have performed over 50 market price assessments on behalf of a variety of clients, for such purposes as: supporting merchant plant financings; supporting the financing of utility generation divestitures; supporting go/no-go decisions by generation developers; and for the general price awareness of various other market stakeholders. In addition, R. W. Beck has extensive experience in modeling transmission systems throughout North America, and has integrated this experience and knowledge into its market price studies. These studies have enabled our clients to assess how plant sitings and location-based market pricing will affect their future market value.

Our recently completed and ongoing power market assessment analyses include the modeling of all NERC reliability regions. Table 2-1, provided at the end of this section, summarizes R. W. Beck's representative market assessment experience across North America. Please note that the table is structured around the NERC region (or subregion) analyzed and the simulation software utilized; a number of these line items represent multiple modeling assignments for a variety of different stakeholders and for different purposes. The total number of studies represented in this table exceeds fifty (50). Table 2-2 lists recent market studies that were performed by R. W. Beck to directly support project financings.

PROJECT PROFILES

Following are selected examples of our recent experience that relates directly to power market assessment and regional modeling.

Southwest Power Pool Market Price Assessment

City of Wichita – WRI/KCPL FERC Merger Case

The City of Wichita hired R. W. Beck to assist in preparing its argument in the proposed merger between Western Resources, Inc.

and the Kansas City Power and Light Company before the Federal Energy Regulatory Commission. As part of the testimony filed by R. W. Beck in the arguments for the City, it was necessary to perform a market price assessment of the Southwest Power Pool, in order to show the arbitrary nature of the wholesale transactions that were being proposed between the merged companies when compared with market rates that are projected over the next five years.

In order to support the testimony, an analysis was made of the projected hourly market clearing prices for the KPL, KGE and KCPL regions of the SPP for the year 1999 through 2003, by running a multi-region market pricing model. Single stand-alone system models were performed for KPL, KGE and KCPL to determine the hourly marginal energy price for each system. A combined model for KPL, KGE and KCPL was created to establish the energy exchange between each company on an hourly basis.

To project potential lost revenues to each of the various operating companies, the hourly energy exchange between each company was multiplied by difference between the hourly market clearing price and the average of the hourly marginal energy cost of the two companies exchanging energy. The average hourly marginal energy price represented an approximation of the price for the energy that was being exchanged between companies, versus the market clearing price that represents what a particular company would be expected to achieve on the open market.

For each model discussed above, a PROSYM model for the region in question was developed. To establish the market clearing price, a model for the entire SPP was analyzed, including exchanges of energy between those areas that are contiguous to the SPP.

Projected Marginal and Market Prices for the Entergy Region

Confidential Client

R. W. Beck prepared projections of market prices for electric energy for an industrial client that is considering whether to build or buy to meet their future requirements. These projections involved developing market prices for the Entergy market region during an assumed market transition period and under a fully deregulated generation market. In preparing these projections, R. W. Beck modeled over 1,000 separate generating resources to serve regional loads in excess of 125,000 MW. For this assessment, R. W. Beck used a rigorous approach that took into account among other things: (i) chronological dispatch; (ii) multi-area interconnected market regions with transmission constraints; (iii) multi-block bid prices; (iv) operational constraints, forced outages, maintenance schedule; and (v) capacity cost adders (as appropriate) when resources are in short supply. The results were provided in the form of marginal and market prices by time-of-day, monthly on-peak and off-peak prices, projected average annual energy prices and projected price duration

curves. Sensitivity cases were prepared to reflect low capacity expansion, high fuel costs and low fuel costs.

Market Assessment for Appraisal Purposes

Arkansas Electric Cooperative Corporation (AREC)

R. W. Beck was retained by AREC to conduct an appraisal of their generating assets. This assessment was performed based on an analysis of the power market in the Southwest Power Pool (SPP). Market energy and capacity revenues and variable and operating costs were modeled for each of AREC's resources. Net market revenues were applied to forecast fixed operating and capital costs for the facilities to determine the net market value of the resources.

Market Value Of Generating Resources & PPA Options

Orlando Utilities Commission

R. W. Beck performed a market price assessment and resource valuation analysis for the Orlando Utilities Commission (OUC) to assess the market value of its Indian River generating resources and purchase power offers that OUC received in coordination with offers to buy the Indian River facilities. These studies are based on an analysis of projected hourly market transactions between 40 interconnected market areas, spanning the entire Eastern Interconnected Electric Systems of the United States and Canada, and including relevant transmission interface constraints. Through these studies, market clearing prices were projected for a ten-year period through 2008, which were then used to assess the market value OUC's resources and rank the proposed PPA's. In addition to the market value analyses, R. W. Beck provided the client with projections of market clearing prices summarized annual, monthly, by on-peak and off-peak strips, and hourly (in an electronic format) for use by the OUC in their own planning studies.

Market Clearing Price Projections

The Energy Authority

R. W. Beck performed market price forecasting analysis for The Energy Authority, a power marketer located in Jacksonville, Florida, for use by the client in evaluating the risk of future long-term power sales opportunities. The market price analysis was specifically geared to mimic the extreme price volatility that was experienced during the summer of 1998. A letter report, summarizing methodology and market price projections was provide to the client, with market price projections being summarized annually, monthly, and weekday 16-hour strips.

Market Price Projections & Stranded Cost Study

Florida Municipal Power Agency

R. W. Beck performed market price analysis for the Florida Municipal Power Agency (FMPA), which formed the basis for a subsequent stranded cost study. The market price study was based on an analysis

REGIONAL MODELING AND POWER MARKET ASSESSMENT EXPERIENCE

of projected hourly market transactions between 40 interconnected market areas, including relevant transmission interface constraints, comprising the entire Eastern Interconnected Electric Systems of the United States and Canada. This study provided a ten-year projection of market prices through 2009. The market prices were then used in an evaluation of projected stranded costs for FMPA's generating and purchase power resources, and have been used to support cost allocation and rate making for FMPA's charges to its members.

Florida Electric Utility Industry Restructuring Description and Estimated Energy Costs

Confidential Client

R. W. Beck prepared an assessment for a large industrial customer of the estimated timing of electric industry restructuring in Florida, as well as an estimate of the corresponding market prices of electricity potentially available to the customer. For comparison purposes, projections of existing electric utility tariffs, assuming no restructuring, were also developed.

The assessment included the firm's view of the electric utility industry's restructuring status in Florida, a description of the driving issues, an overview of regulatory and legislative environment, and a projection of the timing and anticipated structure of reregulation in the State.

Projected market prices of electricity were developed under different scenarios to demonstrate how future decisions to add generating capacity in the State could impact market prices and to provide a potential range of future market prices available to the industrial customer.

Market Analysis and Merchant Plant Review

Confidential Client

A macro and micro marketing analysis was conducted for a confidential client interested in developing a merchant plant in Florida. The macro analysis consisted of a high-level overview of the demand for resources assuming the current situation and under a deregulated market scenario. This analysis took into consideration a statewide coincident peak demand, a statewide capacity reserve plan, an optimal resource-type additions calculation, economic retirements, and transmission interface capability.

The micro analysis will take into consideration cross-utility rate class subsidies, a review of the needs of different types of electric utilities, potential pricing structures for the sale of a merchant facility projected revenue for different types of generation facilities, and a review of the characteristics of an ancillary marketplace.

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Valuation of Generating Assets Using Market-Priced Power

Confidential Clients

As a means for evaluating power supply alternatives, several Southeast based joint-action municipal power agencies have engaged R. W. Beck to study the value of their base-load generating assets. These valuation studies utilized, among other methodologies, the income stream approach using projected market-priced power under several different assumptions about the future. R. W. Beck's extensive modeling capabilities and knowledge of utility operations in the Southeast proved to be the key ingredients in completing these studies in a timely manner.

Southeastern United States Valuation of Generating Assets Using Market-Priced Power

Confidential Clients

As a means for evaluating power supply alternatives, several Southeast based joint-action municipal power agencies have engaged R. W. Beck to study the value of their base-load generating assets. These valuation studies utilized, among other methodologies, the income stream approach using projected market-priced power under several different assumptions about the future. R. W. Beck's extensive modeling capabilities and knowledge of utility operations in the Southeast proved to be the key ingredients in completing these studies in a timely manner.

Projected Participation in Regional Bulk Power Markets

MEAG Power

As part of the preparation of MEAG's projected operating results for a ten-year study period, R. W. Beck developed projections of MEAG's generating resource operations and off-system transactions. These projections assumed MEAG would make sales to and purchases from a reregulated bulk power market. The methodology involved utilizing a regional generation dispatch model that incorporated major utilities in Florida, Georgia and South Carolina to produce projections of hourly "clearing prices" for capacity and energy in each interconnected market. These clearing prices include provisions for recovery of transmission wheeling and losses and a margin of profit for each transaction between MEAG and the power markets.

Study of Projected Market Rates in VACAR for the Period 1996-2005

Confidential Client

R. W. Beck was engaged by a utility located in the Virginia-Carolinas region to perform a study of the projected market price of firm power delivered to the Virginia Electric Power Company control area. The project involved the following areas of study: (1) projections of current forward prices for electricity (based on a model of the ECAR

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REGIONAL MODELING AND POWER MARKET ASSESSMENT EXPERIENCE

region) under a range of assumptions about future economic and competitive factors; (2) testing the reasonableness of the current forward prices using available actual bid data and information obtained from power marketers; and (3) projections of the regional marginal cost of power based on hourly incremental energy cost projections for the assumed low-cost, benchmark utility in the region and based on the capital costs of a CT unit. The work also involved input from several power marketers. The results of the study, which were provided in a detailed report, were used by the client as part of its overall strategic planning activities.

Option Value of a Peaking Project

North Carolina Eastern Municipal Power Agency

NCEMPA retained R. W. Beck to prepare analyses that would assist it in the decision of whether to go forward with a proposed Peaking Project that includes two 115 MW combustion turbines. As part of the analyses conducted, we approached the decision for NCEMPA to go forward with building the Peaking Project by viewing the decision from the same perspective as a merchant power plant developer. That is, a developer considering whether to build a combustion turbine project would, in addition to performing a deterministic analysis of the market value of the output, determine the "value of optionality" that can be attributed to the project when treated as a "spread option." Generally, a generating unit project can be treated as a call option on the spread between fuel (gas or oil) and power. When the market price is higher than the dispatch cost of the project, the owner of the resources sells the output to the market. The greater the amount of volatility in fuel prices and market prices and the lesser the degree of correlation, the greater the value of the option. The process involves converting the combustion turbine project to an equivalent financial derivative, and evaluating the value of that financial derivative based on standard financial methodologies for such investments. The option value would be compared to the investment associated with developing the Peaking Project.

In a deterministic evaluation of a project's net revenues and market value in a market environment, various possible future scenarios are typically represented. In any given hour the market value is determined by the projected difference (spread) between the cost of dispatching the resource (fuel plus variable O&M) and the projected hourly market price. Such a spread at an assumed heat rate is referred to as the "spark spread." In option modeling of generating assets, the uncertainty of the spark spread is captured in fuel price volatility, market price volatility, fuel and market price forward curves and the correlation between fuel and market prices.

To the extent a probabilistic spread, which takes into account the uncertainty and volatility of major underlying assumptions, is greater than the spread under the deterministic approach it adds optionality value. Projects in which there is a high dispatch cost relative to the

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market price and which represent a relatively small spread under a deterministic approach are likely to have the greatest potential for additional optionality value, since potential events that would increase the spread would increase the value of the option, but potential events which would cause the spread to be negative do not reduce the value of the option if the project has sufficient operating flexibility.

Various Regional Market Price Assessments Evaluation of Generating Opportunities

Confidential Client

R. W. Beck investigated potential opportunities for siting merchant plants in locations where relatively high-cost existing generation currently operates. The scope of the investigation included geographic areas in the northeast, south and southwest. The focus of the study was to identify existing generating plants that must operate due to external requirements or constraints, such as providing local voltage support, addressing transmission constraints, providing operating reserves and other operating requirements. In addition, the study utilized a customized load-flow power tracing program to identify import zones, which had large power imports and higher than average loss factors. These import zones indicated a lack of local generation and could represent additional sites for siting merchant plants.

Market Based Pricing of Electric Reliability Council of Texas (ERCOT) Region

City of Bryan, Texas

R. W. Beck was retained by the City of Bryan, Texas to conduct a review of the wholesale electric market in Electric Reliability Council of Texas (ERCOT) region in order to develop estimates of the current and future market for various wholesale energy products. The scope of work included:

- Regional Energy Pricing based on system lambda's, energy displacement and combine cycle marginal energy
- Regional Capacity Pricing developed a forecast of the market price for capacity based on the current surpluses and transitioning to future competitive pricing
- Full production cost recovery of all ERCOT utilities over the study period
- Marginal production cost recovery of ERCOT utilities
- Predatory pricing for a specified period of time that will then transition into a combination of the above

REGIONAL MODELING AND POWER MARKET ASSESSMENT EXPERIENCE

Develop Wholesale Model for the Electric Reliability Council of Texas Region

Public Utility Board of Brownsville/Texas

R. W. Beck was retained by the Brownsville Public Utility Board to develop a wholesale market computer model for the "local" Electric Reliability Council of Texas (ERCOT) market, for use in their selling and purchasing decisions.

Power Market Assessment/Electric Reliability Counsel of Texas Region

Confidential Client - Power Developer

R. W. Beck was retained to conduct a power market assessment of the Electric Reliability Council of Texas (ERCOT) region. Our approach to this assessment involved an understanding of the historical background of ERCOT and its influences on the market, combined with an analysis of how these primary influences are changing in the current political environment. The assessment reviewed market projections, or range thereof, of future electricity prices. The specific issues reviewed include: transmission constraints; review of firm and non-firm price trends; projections of economy energy price trends; and sensitivity analysis/scenario planning. This assessment was completed through:

- An analysis of loads and resources in ERCOT and surrounding regions and through a review of planned capital improvements
- Current "deals" in the market
- Costs of "new" units
- Direct discussions with utilities and marketers
- A review of and comparison to other deregulated industries
- Review of data and studies provided by the power marketer

The report addressed the capacity situation in Texas, particularly within ERCOT, and discussed and developed a "market price" for power that the facility could expect to obtain.

Southern ERCOT Power Market Assessment Study

Public Utilities Board of Brownsville/Texas

R. W. Beck is currently engaged in performing a market price assessment study for the ERCOT region on behalf of the Public Utilities Board (PUB) of Brownsville. The study evaluates available loads and resources in the region for a ten-year projected study period. Based on the availability of resources and the resources' incremental costs, the analysis will determine a bandwidth of possible market prices. Using this bandwidth, the study will project market prices within the region that can reasonably be expected at the wholesale level. The study is being used by the PUB to determine

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and verify any stranded costs to be incurred by the PUB, which may be associated with its generation units.

Power Market Assessment

International Netherlands (U.S.) Capital Corporation

R. W. Beck was retained by International Netherlands (U.S.) Capital Corporation (ING Capital) to conduct a power market assessment of the Electric Reliability Council of Texas (ERCOT) region. This assessment was done to determine the viability of selling the Pasadena Cogeneration Project's anticipated capacity and energy on the open market. This project was unique in that it was one of the first of its kind to be performed in conjunction with an independent engineering review in support of non-recourse financing for a merchant plant.

Our approach to this assessment involved an understanding of the historical background of ERCOT and its influences on the market, combined with an analysis of how these primary influences are changing in the current political environment. The assessment reviewed market projections, or range thereof, of future electricity prices. The specific issues reviewed include: transmission constraints; review of firm and non-firm price trends; projections of economy energy price trends; and sensitivity analysis/scenario planning. This assessment was completed through:

- An analysis of loads and resources in ERCOT and surrounding regions and through a review of planned capital improvements
- A review of current transactions in the ERCOT market
- An analysis of the cost of installing new generating capacity
- Direct discussions with utilities and marketers
- A review of and comparison to other deregulated industries
- Review of data and studies provided by the power marketer

R. W. Beck also assessed how changes in the electric industry can be related to changes that have occurred in other deregulated industries; the gas, communications and airline industries.

Our final report addressed the capacity situation in Texas, particularly within ERCOT, and discussed and developed a "market price" for power that the facility could expect to obtain.

Market Price Assessment-Eastern North America

Confidential Client

R. W. Beck has performed a detailed market price assessment modeling of the eastern portion of North America on behalf of a confidential client. The geographic area of investigation consisted of: (1) the entire Northeast Power Coordinating Council (NPCC) area

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including the New York Power Pool, Ontario Hydro and Hydro Quebec; (2) portions of the Mid-Continent Area Power Pool (MAPP) region including Manitoba; and (3) portions of the East Central Area Reliability Council (ECAR) region including Michigan. The purpose of the analysis was to explore the economic effects of pending deregulation upon various portions of this interconnected electric system and to project the resulting differences in the market price for power in various sub-regions.

New England Market Price Analysis
Financing of a Merchant Plant

Kredietbank

R. W. Beck performed a detailed assessment of the market price for capacity and energy in the New England market, in support of the $217 million financing of a merchant generating plant. Kredietbank provided an 18-year note to finance the construction of a 270-MW gas-fired, combined-cycle merchant generating unit. R. W. Beck's analysis examined projected project revenues under a base case, downside case and upside case over a 20-year analysis period. Separate revenue streams were projected for capacity revenues and energy revenues to be obtained via the newly established bid-based Power Exchange (PX) instituted by NEPOOL's ISO New England. Market Energy Prices were projected based upon a detailed computer dispatch simulation of the entire Northeast Power Coordinating Council area, including NEPOOL, the New York Power Pool, Ontario, Quebec and the Canadian Maritimes.

Power Supply Analysis and Market Assessment

Ontario Hydro and Goldman Sachs/Ontario, Canada

Goldman Sachs requested that R. W. Beck perform an analysis of Ontario Hydro's generating systems to determine the effect of various alternatives, including unit shutdowns or retirements and higher levels of sales or purchases. In addition, R. W. Beck: (1) reviewed the planning reserve criteria, availability of generating units and benefits of transmission interconnections and (2) investigated the effect that higher reliability would have on system costs.

R. W. Beck's analysis included the development of a load dispatch model of Ontario Hydro's load and generating facilities. Following the submittal of a report describing the results of the study, R. W. Beck personnel participated in meetings of a financial restructuring committee and met with area power suppliers to discuss the potential for additional power exchanges.

Subsequent to the initial effort for Goldman Sachs, R. W. Beck was retained by Ontario Hydro to perform additional analyses of the power supply system. For this study, R. W. Beck used the load dispatch model to investigate the effect of various levels of load reduction and reduction in nuclear generation output.

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New England Market Price Analysis
Alternate Technology Evaluation
Confidential Client

R. W. Beck has performed regional market price projections for a confidential developer client interested in constructing one of several alternative generating plant options in the New England (NEPOOL) region. The computer simulation software models the entire Northeast Power Coordinating Council (NPCC) area, reflecting price-based interchanges between NEPOOL and surrounding areas. The bid-based simulation reflects the expected performance within the restructured New England market, based upon the existing ISO-New England structure and the upcoming Power Exchange.

The focus of the analysis was to not only produce regional projections of market clearing prices, but also to evaluate different proposed generation project configurations, while evaluating the expected revenue streams for each separate option. The results of the analysis will facilitate the selection of the most economic generating project option for the developer.

California Market Price Assessment
Developer of Merchant Plants
Confidential Client

R. W. Beck is performing a market price projection of the newly evolving competitive market in California, on behalf of a confidential client interested in developing merchant plants to serve that area. The analysis will be based upon a detailed computer dispatch simulation of the entire Western States Coordinating Council (WSCC) area, with focus on the competitive market developing in California under the Independent System Operator (ISO). The analysis will project total revenues received by the merchant plant as a function of the Power Exchange (PX) dispatch and ISO rules.

Arizona-New Mexico Market Price Assessment
Developer of Merchant Plants
Confidential Client

R. W. Beck is performing a market price assessment for the Arizona and New Mexico region, in connection with a confidential client's planned development of merchant plants in that area. The analysis will be based upon a detailed computer dispatch simulation of the entire Western States Coordinating Council (WSCC) area, with emphasis on the developing competitive market in the Arizona/ New Mexico region. Merchant plant revenues associated with both capacity and energy will be projected for a base case and various sensitivity cases.

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Market Assessment
PJM, New England and New York Regions

Confidential Client

R. W. Beck performed a detailed generation market assessment on behalf of a major developer client to investigate the potential for cost-effective generation additions in each of PJM; New England (NEPOOL) and New York (NYPP). The focus of the study was a determination of capacity saturation levels for new generating resource additions in each region. Detailed computer simulations were developed of the bid-based dispatch within each of these three market regions based upon a zonal representation of each market. Separate projections of market-based revenues were prepared for capacity and energy.

Market Assessment and Review of the Pennsylvania-Jersey-Maryland (PJM) Interconnect Area Electric Market

Confidential Client/Pennsylvania, New Jersey, Maryland

R. W. Beck was retained to conduct a review of the PJM power market with respect to the sale of a generating asset. The review includes the development of projected energy clearing prices and long-term capacity values. The loads and resources in the region are currently being reviewed and future deficits will be forecast in the development of market power cost projections.

Power Supply Market Assessment

Municipal Power System

R. W. Beck, Inc. was retained by the City of Piqua to conduct a power supply market assessment for the Piqua Municipal Power System. The scope of work includes:

- Preparation of a narrative report describing current changes in the electric utility industry
- Description of possible end-states for the electric utility industry of the future
- Analysis of implications of the changes in the utility industry for the Piqua Municipal Power System
- Assessment of the regional power supply market
- Examination of the prevailing market prices in the area
- Extension of current market prices for future periods
- Analysis of the cost of continued operation of existing steam-electric generation
- Comparison of estimated generation costs and market prices for purchased power

The assessment includes an examination of the availability of capacity in the regional bulk power supply market, a discussion of the changing view on capacity planning by electric utilities in the region and advances in generation technologies affecting future power

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supply availability and costs and an estimate fuel use by type for incremental utility sales into the regional bulk power market. The consideration of prevailing market prices summarized available information for firm power supply for one to ten year contract terms. These near-term power supply bids were extended for a 20-year planning horizon taking into account anticipated trends in regional incremental fuel costs, incremental O&M, charges for capacity, wheeling and losses and costs of emission allowances.

Power Supply Market Assessment
New England Region
U.S. Generating Company

At the request of U.S. Generating Company, the firm performed an independent engineering assessment of the pricing for the long-term power supply market in New England. Our assessment was based upon R. W. Beck's broad background and experience in the power supply planning field, as well as our extensive and varied project-specific knowledge gained through the independent review of over 350 non-utility generation projects worldwide. Our task was to assess the likely market price for long-term power commitments within the region, over the period spanning from 1999 through 2028. The intent of our analysis is to provide an economic "yardstick" of competition with which to compare the pricing being offered to potential buyers of power from the Taunton Energy Center (TEC) Project, being sponsored by U.S. Generating company.

Our market assessment was based upon developing projections of the prevailing electricity cost pricing associated with the technology believed to be the "low cost producer" currently available in the market, which a potential long-term power purchaser might evaluate as an alternative to participation in the TEC Project. Based upon the present expectations for long-term power supply options, which are currently available to be developed in the region, the technology believed most likely to be considered the "low cost producer" is a modern technology, gas-fired combined cycle (GFCC) unit. Under current conditions, such a project would most likely be sponsored by a non-utility generator (NUG) developer and configured as an exempt wholesale generator (EWG). In order to assess the overall energy pricing that would likely be associated with the NUG-GFCC unit, we developed a generic pro forma for this hypothetical "proxy" unit. The results were validated by comparing a number of other benchmarks related to other long-term options in the region. Sensitivity analyses were performed investigating the impact upon market price results due to varying key analysis assumptions.

Power Supply Monthly Dispatch and Planning Model
Deseret Generation and Transmission Cooperative

In order to assess the economic potential of a number of power marketing alliances, R. W. Beck developed a monthly dispatch and

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planning model for Deseret's generating assets. A detailed five-year spreadsheet model was developed, which dispatched Deseret's units considering unit operational limitations, member and non-member contractual obligations, incremental costs, market pricing and specific power marketing alliance contractual terms and conditions.

The computer model included market projections for monthly firm and non-firm commodity prices for on-peak and off-peak energy. Additionally, the model incorporated a sensitivity analysis regarding the price and quantity of energy sold into the market.

The results of the model helped Deseret determine an expected value revenue stream, which was used for planning purposes in their debt restructuring process and was used to select a power marketing alliance partner.

The model was additionally used during negotiations with the selected power marketing partner to evaluate and determine Deseret's position regarding specific negotiated terms and conditions.

New England Market Price Projections

Energy New England

R. W. Beck performed an analysis of the long-term market price for power in the New England (NEPOOL) region on behalf of a consortium of municipal electric utilities in the area. The market price projections were prepared with computer simulation software, which models the entire Northeast Power Coordinating Council (NPCC) area, with price-based interchanges between NEPOOL and the surrounding regions. The computer model is capable of handling dispatch on a bid-based approach, rather than the more typical incremental heat rate production costing of most other computer software models.

The analysis included base case and sensitivity case scenarios, producing not only regional estimating of hourly market clearing prices, but also unit-specific revenue streams for selected key generating units.

New England Market Price Assessment Competitive Position of Restructured Nug Project

Sanwa Bank

R. W. Beck performed a regional market price projection for capacity and energy in the New England (NEPOOL) market, in the support of a restructured financing of an existing non-utility generator (NUG) unit. The NUG was interested in lengthening the term of its debt in order to allow it to reduce near-term power costs and become more competitive in the new marketplace. The bank needed to assess the long-term viability of the NUG project.

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Revenue streams were projected for both energy and capacity based upon the expected operating rules of the evolving Power Exchange (PX) and Independent System Operator (ISO). The market price projections were assessed based upon a detailed computer dispatch simulation of the entire NPCC region, including NEPOOL, New York and eastern Canada.

New England Market Price Assessment Financing of Utility Unit Acquisitions

Bank of Montreal

R. W. Beck has performed a detailed regional market price assessment for energy and capacity markets in New England, in support of the financing of Sithe Energy's acquisition of the former Boston Edison generating units. Also being financed are two, 700-MW merchant plants to be located at the existing facility sites.

Our analysis involved a projection of revenues for each of the portfolio's generating assets for a base case and ten sensitivity cases. The projections were based upon a detailed computer dispatch simulation of the entire NPCC region, including NEPOOL, New York and eastern Canada.

Duquesne Light Company Generation Asset Valuation

Duquesne Light Company

As part of the transfer of generation assets between Duquesne Light Company ("DLC") and First Energy Corporation ("FEC"), and as part of DLC's divestiture and sale of generation assets to Orion Power Holdings, DLC's mortgage of indenture required independent engineer's certificates regarding the exact value of each DLC and FEC asset included in the transfer. DLC retained R. W. Beck to be the independent engineer required to provide the certificate.

As part of the analysis, R. W. Beck performed a complete appraisal on DLC's generation assets. This appraisal included an analysis of the replacement cost of each plant, an analysis of the projected net income stream for each plant, and an analysis of the comparable sales for each plant. Each of the assets were reviewed and valued from all three valuation approaches, including assessments for the age and condition of the assets. Under the income analysis, a full market pricing model of the East Central Area Reliability Council ("ECAR") region was completed and market sales and operation were projected for each DLC/FEC asset, including projected market income, generation output and generation operating costs.

Additional certificates will be prepared to meet the secured indenture requirement when the assets received by DLC from FEC and the remaining DLC generation assets are sold to Orion Power Holdings, sometime in early 2000. A report detailing the analysis will be presented to DLC.

TABLE 2.1
Representative Market Price Projection Experience

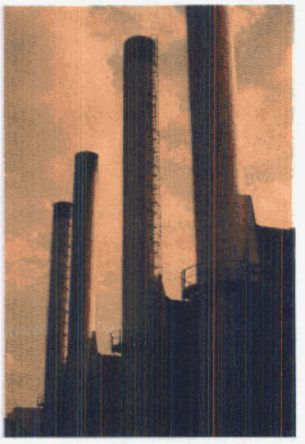
	NERC Region	Model Used	Type of Market Price Projection	Study Date	Type of Client	Forecast Period
1.	ERCOT	PROSYM™ Beck Capacity Displacement Model	Energy and Capacity	5/97 – Ongoing (multiple projects)	Multiple Developers	1997-2020
2.	ERCOT	PROSYM™	Energy and Capacity	Ongoing	Multiple Developers	1998-2010
3.	FRCC	PROSYM™ IREMM™	Energy and Capacity	8/98 – Ongoing (multiple projects)	Multiple Developers, Utility, Municipal Joint Action Agency	1998-2020
4.	FRCC	PROSYM™	Energy and Capacity	5/97- Ongoing	Industrial, Developer	1997-2012
5.	MAIN/SPP/MAPP/ECAR (MAIN Focus)	PROSYM™	Energy and Capacity	3/99	Developer	2000-2020
6.	NPCC (NEPOOL Focus)	PROSYM™	Energy and Capacity	3/97 – Ongoing (multiple projects)	Multiple Developers, Financial Institutions and Utilities	1998-2019
7.	NPCC (NYPP Focus)	PROSYM™	Energy and Capacity	Ongoing	Multiple Developers and Financial Institutions	1998-2007
8.	NPCC/MAPP/ECAR (Canadian Focus)	PROSYM™	Energy and Capacity	8/98 – Ongoing	Financial Institutions	2000-2018
9.	PJM/ECAR/SERC/NYPP (Multi-Region Analysis)	PROSYM™	Energy and Capacity	2/99	Developer	1999-2011
10.	SERC/FRCC	IREMM™	Energy and Capacity	8/98	Power Marketer	1998-2004
11.	SPP/SERC (Entergy Region)	PROSYM™	Energy and Capacity	2/98 – Ongoing (multiple projects)	Industrial, Developer	1998-2020
12.	SERC (VACAR)	PROSYM™ IRP Manager™	Energy and Capacity (Wholesale and Retail)	10/95-1/98 (multiple projects)	Multiple Municipal Joint Action Agencies	1996-2015
13.	VACAR/SERC	PROSYM™	Energy (all inclusive)	4/98 (multiple projects)	Municipal Joint Action Agency	1998-2006
14.	WSCC (AZ/NM Focus)	PROSYM™	Energy (all inclusive)	6/98 Ongoing (multiple projects)	Developer, CR Utility/Power Marketer	1998-2007
15.	WSCC (CA Focus)	PROSYM™ IREMM™	Energy (all inclusive)	3/98 – Ongoing (multiple projects)	Multiple Developers	1998-2007
16.	ECAR	PROSYM™	Energy (all inclusive)	Ongoing	Multiple G & T Cooperatives	2000-2010
17.	SPP/SERC (SPP Focus)	PROSYM™	Energy and Capacity	Ongoing (multiple projects)	Developer, Utility / Merger	2000-2020

TABLE 2.2
Market Pricing Studies
Supporting Project Financings

Study Date	Region	Sponsor	Project	Lending Institution	Status
Dec. 1996	ERCOT	Calpine	Pasadena I	ING Bank	Operating
Nov. 1998	ERCOT	LG&E	Columbia Gregory	ING Bank	Financing
Jan. 1998	NPCC	El Paso Energy	Berkshire Power	Kredietbank (KBC)	Under Construction
May 1998	NPCC	Sithe	BECO Assets	Bank of Montreal	Acquired
Feb. 1999	ERCOT	Calpine	Pasadena II	ING Bank	Under Construction
Oct. 1998	NPCC	EMI	Tiverton Project	Landesbank Hessen-Thurington (Helaba)	Under Construction
Nov. 1998	NPCC	EMI	Rumford Project	MeesPierson Capital	Under Construction
Feb. 1999	NPCC	Southern	Commonwealth Energy Assets	ING Bank	On-hold
Mar. 1999	NPCC	El Paso Energy	Milford Project	Kredietbank (KBC)	Evaluation
Apr. 1999	NPCC	Wisvest	United Illuminating Assets	Credit Lyonnais	Acquired
Sept. 1999	ERCOT	Panda	Guadalupe Power	ING Bank	Financing

Section 3

POWER SUPPLY & DEREGULATION EXPERIENCE IN THE SOUTHEAST U.S.



Since its founding more than 55 years ago, R. W. Beck has been providing power supply planning services to electric utilities, governmental entities, the private sector and other large energy consumers. Historically, R. W. Beck has had extensive experience in performing both long-term and short-term power supply studies including developing computer simulations of the hourly economic dispatch of power supply resources, conducting generation expansion planning and production costing, and performing economic feasibility analyses. As the electric utility industry has moved towards a competitive market, such studies have included projecting market clearing prices, competitive analyses, assessing industry restructuring issues and conducting request for proposal processes to obtain market based purchased power supplies.

R. W. Beck has had an office in Orlando to serve the Florida market since 1965, and has served the wholesale market in the state continuously since then. We have served 28 of the 33 municipal electric utilities in the state during that period, and were instrumental in establishing the Florida Municipal Power Agency in 1978, and have provided consulting services to this organization ever since. These services have included analysis of the transmission grid, rate studies, negotiations with investor-owned utilities, requests for power supply proposals, evaluation of power supply alternatives, owner's engineering and competitive assessments.

PROJECT PROFILES

The following are selected examples of power supply related studies that represent our experience in the Southeast U.S.

Formation of an ISO

Seminole Electric Cooperative, Florida

R. W. Beck assisted Seminole Electric Cooperative in developing their positions on the principles and concepts that should be included in implementing a state-wide Independent System Operator (ISO) for the Florida transmission grid. Using a series of strategic planning meetings, R. W. Beck staff members worked with Seminole's staff to accomplish the following:

- Develop a list of operational, cost, governance, and other ISO issues that must be addressed;
- Examine how other existing and proposed ISO's addressed these issues; and
- Evaluate alternative options based on the specific technical and business requirements in Florida.

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The above process resulted in a position document to be used in helping Seminole management understand and influence the future direction of transmission arrangements in the state.

Florida Regional Transmission Organization (RTO)

Florida Municipal Power Agency
Seminole Electric Cooperative

R. W. Beck is assisting FMPA and SEC in their efforts to promote the development of a Regional Transmission Organization in Florida to enhance the development of the competitive wholesale power market in the state. Services provided to date have included:

- Development of the concepts and principles for a Florida RTO
- Development of position papers on Florida RTO issues, such as transmission rate design, for presentation to the Florida Public service Commission (FPSC)
- Presentations at the FPSC Workshops on RTOs
- Development of example RTO agreements and contracts
- Review and comment on the FERC RTO NOPR

As part of this project, FMPA and Seminole have now developed an ad hoc working group (the ITA Group) comprised of more than a dozen utilities, independent power producers, and power marketers that support the development of an RTO in Florida. R.W. Beck, through its arrangements with FMPA and SEC, is now assisting the ITA Group in developing a "strawman" proposal to be made to the FPSC regarding the establishment of an RTO in Florida.

Merchant Plant Site Development/Redevelopment

Confidential Client

As a result of the firm's extensive knowledge and experience in executing projects involving the Florida electric grid, R. W. Beck, Inc. has been retained by a confidential developer to provide engineering consulting services in connection with a power generation program that is proposed for development at an existing power plant site in South Florida. The program is comprised of an initial 250 MW of combined-cycle generation, to be followed by a further 250 MW at a future date. Initially, R. W. Beck performed a preliminary evaluation of the infrastructure at the power plant site to determine its ability to accommodate the proposed development. Items evaluated by R. W. Beck were: water supply and discharge; gas supply and transportation; air emissions and permitting; and, electrical interconnection to the State grid. A load flow analysis was also performed using the Florida Reliability Coordinating Council's model of the transmission grid to evaluate the impact of the additional generation on power flows in the system. R. W. Beck also performed a transient stability analysis to determine the response of the electric system to such abnormalities as the trip of the grid inter-connector and the trip of a large generator. In addition, R. W. Beck is evaluating

options and providing planning level cost estimates for interconnecting the proposed generators to grid and will assist our client in securing an interconnection agreement and any necessary transmission services.

Section 211 Transmission Filing

Florida Municipal Power Agency (FMPA)

R. W. Beck assisted Florida Municipal Power Agency in the filing and negotiations regarding the agency's request for network transmission service under Sections 211 and 212 of the Federal Power Act. The firm was responsible for the development of the rates, terms, and conditions for network transmission filed before FERC. The firm also submitted affidavit testimony to the FERC in support of the various positions being taken by FMPA. Contracts developed during this effort became the basis of a significant portion of the Pro-Forma Tariff issued by the FERC in Order 888. This project also represented the first ever approval of network transmission under Section 211 by FERC.

Load Aggregation Using Network Transmission

Florida Municipal Power Agency

In a first of its kind project, R. W. Beck had a lead role in the development and implementation of the "IDO" Project. The IDO Project consists of integrating the operations and planning of geographically dispersed municipal electric utility systems into a single utility to improve the systems' ability to compete. Ten of the utilities are currently operating on an integrated basis. The project represents the first integrated utility operating under the FERC issued pro-forma tariffs for network service. The individual systems are located in Ocala, Jacksonville Beach, Leesburg, Clewiston, Bushnell, Green Cove Springs, Ft. Pierce, Vero Beach, Key West, and Starke, Florida. These utilities are located in several transmission systems, span a distance of over 500 miles, and represent a mix of generating and non-generating utilities. Services involve developing transmission arrangements, performing economic analyses, evaluating transmission alternatives, and developing methodologies for determining rates and credits, and negotiation of Service and Operating Agreements with the transmission providers.

Florida Power Corporation - Wholesale Rate Filings

Florida Municipal Power Agency

For several years, R. W. Beck has provided consulting services to the Florida Municipal Power Agency in connection with the Florida Power Corporation ("FPC") wholesale rate increase application presented before the Federal Energy Regulatory Commission ("FERC"). Services included analyses of the rate filing; identification and quantification of cost of service issues to the extent data is made available by FPC and the client; assistance in negotiations between

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the client, FPC, the FERC staff, and other parties; and, if necessary, the preparation and submittal of testimony before the FERC.

Transmission Rate Services for Jacksonville Electric Authority, Municipal Electric Authority of Georgia, and South Carolina Public Service Authority

Jacksonville Electric Authority

The project consisted of developing proposed transmission rates for three large governmental electric systems located in three states. The proposed rates were developed using FERC order number 888 guidelines in each of the three interconnected entities. In addition, a transmission rate reflecting the combined resources, load, and costs of the three entities were developed. The rates and study were developed in within a week.

Florida Power Corporation - 1996 Pro-Forma Transmission Tariff Filing

Florida Municipal Power Agency

R. W. Beck was retained to provide consulting services to FMPA in connection with the Florida Power Corporation (FPC) pro-forma transmission filing before the Federal Energy Regulatory Commission (FERC). Services include analyses of the rate filing, identification and quantification of issues; assistance in negotiations between the FMPA, FPC, FERC staff, and other parties; and, if necessary, the preparation and submittal of testimony before FERC.

FPL Open Access Transmission Tariff Filing

Florida Municipal Power Agency

R. W. Beck, Inc. provided consulting services to Florida Municipal Power Agency ("FMPA") in conjunction with the Florida Power & Light ("FPL") Open Access Transmission Tariff filings before the Federal Energy Regulatory Commission ("FERC") which FPL filed on July 9, 1996 in response to FERC order 888.

Services provided included analyses of the filing, identification and quantification of the issues which included major issues of transmission investment credits, isolated loads, cost of service issues and other issues; assistance in negotiations between the Client, FPL, the FERC staff, and other parties; and as necessary, the preparation and submittal of testimony before the FERC.

Avoided Cost Analysis

City of Tallahassee, Florida

The firm assisted the City of Tallahassee in the development of a standard offer contract, interconnection agreement and standards, and transmission agreement for potential cogenerators in accordance with the Florida Public Service Commission cogeneration rules and regulations. The standard offer contracts provide terms and conditions for the purchase of avoided energy, avoided capacity and

energy, and the sale of back-up capacity and energy. As part of the analysis, the City short- and long-run avoided cost and avoided unit were identified and analyzed.

Evaluation of an Electric System Planning Reliability Index

City of Tallahassee, Florida

R. W. Beck provided consulting engineering services to the City of Tallahassee relating to the evaluation of an appropriate electric system planning reliability index to be used for the City's Integrated Resource Planning (IRP) Study.

In the first phase, the analysis initially involved a review of reliability criteria and methodologies used by other utilities such as reserve margin, Loss of Load Probability (LOLP), Loss of Load Hours (LOLH), and Expected Unserved Energy (EUE). R. W. Beck worked with the City to develop a reliability methodology that was readily quantified but which reflects a probabilistic assessment of the City's reliability, considering the City's generating resources, transmission interconnections and resources from neighboring system.

In the second phase, R. W. Beck further refined the reliability analysis to take into account the value of reliability to customers based on outage costs compiled from various sources. A relationship will be developed between reliability and the costs to customers associated with maintaining various levels of reliability.

Florida Power Corporation Avoided Energy Costs

Canadian Imperial Bank of Commerce

R. W. Beck provided consulting services to Canadian Imperial Bank of Commerce to make projections of Florida Power Corporation's avoided energy costs and of the dispatch of the avoided coal unit for the period 1993 through 2008. Based on information contained in public documents, avoided energy costs were projected by running a monthly generation model with and without the avoided coal unit.

Competitive Strategies to Address New Challenges

Florida Municipal Electric Association

R. W. Beck's presentation focused on Florida Municipal Utilities and began with an overall introduction describing what municipal utilities must do to survive in the competitive electric market. The next portion of the talk compared the progress of investor-owned to municipal utilities. The comparison included a discussion of residential and commercial rates for municipal and investor-owned utilities. The seminar also presented graphically the impact on a municipal utility of losing one of its largest customers and the necessity of reducing costs to stay competitive.

The presentation covered the following topics:

- Preparing for a competitive environment

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- Steps the Florida IOUs have taken to prepare for competition
- Steps the Florida municipal utilities have taken to prepare for competition
- Status of activities in Florida with regard to competition
  - IOU's
  - Municipal utilities
  - Regulatory agencies
  - State legislature
- Rate Comparisons – Florida municipal utilities, vs. Florid IOU's

Owner's Engineer
Key West Combustion Turbine Project
Florida Municipal Power Agency

Florida Municipal Power Agency installed two refurbished 19.7 MW GE Frame 5 simple cycle gas turbines at the City of Key West's Stock Island Plant. These units are operated by City of Key West personnel as peaking and emergency service units. R. W. Beck evaluated proposals for refurbished combustion turbines and participated in negotiations with the selected firm, Stewart & Stevenson, for turnkey design, procurement, and construction of the two units. R. W. Beck provided owner's engineer services to Florida Municipal Power Agency, including management of the contract with Stewart & Stevenson. This included review of the project design for contract compliance, administration of contract changes, coordination with City of Key West operations personnel, and chairing monthly project review meetings.

Integrated Dispatch and Operations Study
Florida Municipal Power Agency

R. W. Beck performed a series of studies for the Florida Municipal Power Agency ("FMPA") regarding the economic benefits of integrating the generations of certain municipal utilities in Florida. The studies involved twenty-eight municipal systems, twelve of which served their load primarily with on-system generating resources and sixteen of which were purchases of all-requirements wholesale power from other utilities. The studies were performed in three phases as follows:

- Determination of the overall economic benefits of pooled dispatch of the systems' power supply resources.
- Determination of additional overall benefits that would be derived from joint capacity planning as well as pooled dispatch of all reserves.
- Development of a methodology for allocating the economic benefits to each of the pool members and determination of individual system benefits.

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- Assistance in the development of contractual arrangements necessary to implement the project.

Analysis of Participation in Cane Island Plant

Florida Municipal Power Agency

R. W. Beck performed an analysis of proposed arrangements involving the joint ownership of natural gas-fueled generation to be constructed by the Kissimmee Utility Authority ("KUA") at a site owned by KUA. The purpose of the study was to develop projections of the potential economic benefits that could be derived by participation in the Cane Island Plant.

The analysis was based on the major concepts established in a conceptual framework agreement negotiated between KUA and FMPA. As part of the analysis, sensitivity cases were developed to evaluate different assumed environmental requirements, fuel forecast, plant capital costs, operation and maintenance costs, gas transportation costs, and alternative power costs. In addition, the analysis evaluated the potential benefit of having a site available to add future generation.

Tom G. Smith Power Plant Repowering Project

Lake Worth Generation LLC

Based on our knowledge of the Florida Electric System, R. W. Beck was engaged by Lake Worth Generation LLC, the developer of the Lake Worth Repowering Project, to provide engineering consulting services related to: (i) connecting the electrical output of the generating plant to the electric grid; and (ii) assisting the developer in securing transmission services from Florida Power and Light Company (FPL). The Repowering Project consists of a General Electric frame 7FA combustion turbine with a nominal output of 180 MW along with a heat recovery steam generator that will drive two existing steam turbine generators with outputs of 30 and 45 MW at the Tom G. Smith Power Plant in Lake Worth, Florida. R. W. Beck will evaluate the available options for interconnecting the generators to the grid and provide a recommendation. R. W. Beck will then prepare engineer, procure and construct (EPC) request for proposal for the selected option. R. W. Beck will also assist the developer in negotiating with FPL for transmission services.

Demand-Side Management/Integrated Resource Planning

Florida Municipal Power Agency
City of Vero Beach, Florida

R. W. Beck provided consulting and engineering services to the Florida Municipal Power Agency ("FMPA") and the City of Vero Beach, Florida ("Vero Beach") in connection with the setting of goals and the filing of plans before the Florida Public Service Commission (the "FPSC") relating to demand-side management ("DSM") activities to be pursued by Vero Beach and FMPA's All-Requirements Participants, and relating to Integrated Resource Planning ("IRP")

activities to be conducted by FMPA relating to existing and proposed FMPA programs and Participants.

The project initially includes the following services:

- Review of the "SRC Study" developed by Synergistic Research Corporation for the Florida Energy Office, to determine the applicability of study results to Vero Beach and FMPA and its All-Requirements Participants.
- An economic evaluation of approximately 100 potential residential and commercial DSM measures to determine the economic feasibility of developing and implementing DSM programs in the All-Requirements Participants' service areas. Benefit/cost evaluations include rate impact, total resource cost and participant perspectives.
- The development of ten-year projections of energy and demand reduction goals based on the results of the economic evaluation and the filing of the goals and the results of the economic evaluation with the FPSC.
- The production of expert testimony and rebuttal testimony on the process and analyses performed with respect to the economic evaluation and development of goals for the FPSC filing.

Power Supply Evaluation

Orlando International Airport

Orlando International Airport (OIA) has begun a major expansion to keep pace with the growth of air traffic into Central Florida, and included in this expansion is the buildout over approximately 20 years of a second terminal building and supporting facilities. The electrical load is expected to grow from about 25 MW in 1999 to about 60 MW in 2020, and chilled water requirements are expected to expand in similar fashion. In March 1999, the HNTB Corporation in behalf of the Greater Orlando Airport Authority (Authority) retained R. W. Beck to evaluate the economics of self-generation as compared to continued purschases of electrical service from the Orlando Utilities Commission (OUC) and to comment on a proposed long term agreement being proffered by OUC.

R. W. Beck developed an economic model which evaluated the present worth of costs associated with self-generation using several combined cycle configurations, as well as the costs associated with the continued supply of electricity by OUC.

R. W. Beck also developed estimates of the capital and operating cost inputs to the model, for both electric generation and chilled water production. As a part of the assignment, comments were developed and provided to the Authority on the detriments and benefits associated with the proposed long term agreement. In addition a

comparative analysis was prepared setting forth the various concessions being afforded larger customers in the State by investor owned and publicly owned electric utilities in order to retain existing customers as electric restructuring progresses in Florida with the concessions currently offered to the Authority by the OUC.

Independent Engineering for Batesville Combined-Cycle Project

L.S. Energy Limited Partnership
Credit Suisse First Boston
Batesville Industrial Park, Mississippi

R. W. Beck provided comprehensive independent engineering services to LSP Energy Limited Partnership of East Brunswick, NJ in support of the financing of their project.

The project will be an 837 MW gas-fired combined-cycle facility located in Batesville, Mississippi. The facility will be dispatchable with the output of the facility sold to both Virginia Electric and Power Company and Aquila Energy Marketing Corporation and Utilicorp United, Inc. under two separate power purchase agreements. Electric sales will be 806,100 kW on an annual average basis. The three combustion turbines will be Westinghouse 501Fs and will burn natural gas provided under tolling arrangements. The three power trains operate independently and each consists of a combustion turbine, a duct-fired heat recovery steam generator, and a steam turbine.

R. W. Beck's efforts are focused on providing four phases of Independent Engineering Services; The Technical Review to Support Financing; Construction Monitoring; Perform Test Monitoring; and Operation and Maintenance review.

The Technical Review includes: site visits, evaluating overall consistency of the project, reviewing conceptual design, reviewing construction services including the EPC contract, schedule, LD's, cost estimate, and drawdown schedule; review performance guarantees and tests, review O&M, review off-site supply and transportation agreements, review environmental site assessment, develop projected operating results pro forma, and prepare the Independent Engineer's Report.

The Construction Monitoring Services includes: review of the execution of the EPC contract, attend monthly review meetings and issue construction certificates concerning the construction draws, and review work plans and change orders, and verify mechanical completion.

The Performance Testing Monitoring Services includes: reviewing testing procedures, witnessing tests, reviewing test reports and verifying project completeness.

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The Operation and Maintenance Reviews Services includes: the provisions and requirements of the Bond's trust indenture, including an annual report, review of changes to the project agreements, and certification of payments.

Independent Engineering for Tenaska Georgia Project

Tenaska Georgia Partners, L.P., Heard County, Georgia

R. W. Beck provided comprehensive independent engineering services to Tenaska Georgia Partners, L.P. of Omaha, NE in support of the financing of their project.

The project will be a 936 MW dual fuel simple-cycle facility located in Heard County, Georgia. The facility will be dispatchable with the output of the facility sold to PECO Energy Company under a 29-year contract. Electric sales to PECO will be 936,000 kW on an annual average basis. The six combustion turbines will be General Electric Frame 7 FAs and will burn natural gas as primary fuel and low sulfur No. 2 fuel oil as back-up.

R. W. Beck's efforts are focused on providing three phases of Independent Engineering Services; The Technical Review to Support Financing; Construction Monitoring; and Start-up and Testing.

The Technical Review includes: site visits, evaluating overall consistency o f the project, reviewing conceptual design, reviewing

construction services including the EPC contract, schedule, LD's, cost estimate, and drawdown schedule; review performance guarantees and tests, review O&M, review off-site supply and transportation agreements, review environmental site assessment, develop projected operating results pro-forma, and prepare the Independent Engineers Report.

The Construction Monitoring Services includes: review of the execution of the EPC contract, attend quarterly review meetings and issue construction certificates concerning the construction draws, and review work plans and change orders.

The Start-up and testing Services includes: reviewing testing procedures, witnessing tests, reviewing test reports and verifying project completeness.

Analysis of ISO Arrangements

Municipal Energy Agency of Mississippi,
Lafayette Utility System, and Spiegel & McDiarmid

The Firm was requested by the Municipal Electric authority of Mississippi (MEAM) and the Lafayette Utility System (LUS) to work with the law firm of Spiegel & McDiarmid to review and investigate the rates, terms and conditions associated with the development of an Independent System Operator (ISO) for the Southwest Power Pool (SPP). Services provided by R. W. Beck included:

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- Evaluations of the proposed ISO transmission and ancillary service arrangements and rates.
- Evaluations of the transmission facilities that should be included in the ISO and development of investment information on the client's transmission system.

Entergy Open Access Transmission Filing

Municipal Energy Agency of Mississippi, Lafayette Utility System, and Spiegel & McDiarmid

The Firm was requested by the Municipal Energy Agency of Mississippi (MEAM) and the Lafayette Utility System (LUS), two large municipal customers of Entergy, to assist in the negotiations and litigations at the FERC regarding the Entergy open access transmission filing. We worked with the law firm of Spiegel & McDiarmid to review and investigate the rates for transmission service and ancillary services filed by Entergy. Services provided by R. W. Beck included:

- Review terms, conditions, and rates of the filed tariff to determine if they are just and reasonable.
- Development of positions and economic analyses for use in the intervention filing at the FERC.
- Evaluations of the proposed transmission and ancillary service rates.
- Evaluations of load flow studies and reactive support analyses submitted by the company.
- Evaluations of the terms and conditions for ancillary services, including the proposed treatment of customer supplied ancillary services.
- Development of negotiation positions, economic analyses of alternatives, and assisting in economic evaluations of settlement negotiations.
- Development and filing of expert testimony in the areas of; transmission rate design; terms and conditions for transmission service; and inclusion of customer and company owned facilities in the transmission grid. These services included the presentation of both written and live testimony by the firm's expert witnesses, as well as cross examination on all issues.

Entergy GSU Merger, Testimony at the FERC

Occidental Chemical Corporation

R. W. Beck was retained to develop and present testimony on behalf of the Occidental Chemical Corporation regarding the expected benefits associated with the proposed merger of Entergy Services, Inc. and Gulf States Utilities Company.

Buyout Structuring/Integrated Resource Planning

City of New Orleans, Louisiana

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R. W. Beck assisted the City of New Orleans ("City") in structuring a buyout of the New Orleans Public Service Company ("NOPSI") and Louisiana Power & Light Company ("LP&L") electric system assets serving the City. In the conduct of the study R. W. Beck provided services to the City including:

- Development of a preliminary Integrated Resource/Least-Cost Plan
- Review of existing generation plants
- Solicitation of DSM and supply-side proposals
- Review and evaluation of DSM and supply-side proposals
- Negotiation of short-term, phase-out power supply contracts with NOPSI/LP&L

In structuring the proposed buyout, R. W. Beck structured a short and long-term resource strategy for the City. As part of this assignment, R. W. Beck solicited requests for qualifications and preliminary proposals from potential firms interested in providing the City with: power requirements through both supply-side and demand-side means; and the operation and maintenance of the distribution system. The concept behind the proposals was to establish a public/private consortium for the provision of "low cost" electricity to the City's ratepayers. R. W. Beck provided the City with an integrated resource plan which was based on least-cost planning principals for provision of long-term power. The purposed buyout was structured such that the ratepayers would achieve approximately a 10% savings in electricity cost for 20 years.

Competitive Assessment

Terrebonne Parish Consolidated Government
Houma, Louisiana

R. W. Beck prepared a competitive assessment for the Terrebonne Parish electric utility system (TPEU). TPEU is facing competition pressures from Entergy and other local utilities. The assessment focused on the strategy and action plan necessary for TPEU to remain a competitive force into the future and addressed areas:

- Strategic planning;
- Rate design;
- Management organization;
- Generation ownership issues;
- Expansion or dissolution of distribution assets; and
- Competitive generation plan.

Evaluation of Contract Proposals

Municipal Energy Agency of Mississippi

R. W. Beck evaluated fourteen different proposals for bulk power supply that were submitted to the Municipal Energy Agency of Mississippi ("MEAM") in response to its request for proposals ("RFP"). The evaluation included a three stage process which included: (i)

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screening for minimum requirements, (ii) economic analysis to determine impact of each proposal on MEAM's long range power costs, and (iii) ranking of proposals based on a combination of economic and other factors such as availability, contract flexibility, status of facilities, previous experience with MEAM, technical maturity, scheduling and dispatching and potential for negotiations. Based on this analysis, two power suppliers were selected for final negotiations.

Cost of Power Evaluation

Municipal Energy Agency of Mississippi

R. W. Beck prepared cost projections for the cost of power of the transmission level for certain major utilities in the State of Mississippi. The projections were to be used by the Energy and Transportation Division of the Mississippi Department of Economic and Community Development in updating the State Energy Plan. The cost projections were prepared for the following utilities which were considered representative of the State of Mississippi:

- Municipal Energy Agency of Mississippi
- Mississippi Power Company (MPCO)
- Mississippi Power and Light (MP&L)
- South Mississippi Electric Power Association (SMEPA)
- Tennessee Valley Authority (TVA)

The cost projections for MEAM are based on projected purchased power costs from suppliers and generating members which include operations and maintenance expenses, transmission costs to MP&L, TVA, and others, administrative and general costs, and projected interest expenses from proposed capital improvements and new generation projects.

The cost projections prepared herein for MP&L and MPCO are based upon a projection of revenue requirements which are based on cost of service principles which are currently applicable to investor-owned utility wholesale rates filed with the Federal Energy Regulatory Commission (FERC), which principles include an allowance for return on rate base, depreciation expense, ad valorem tax, federal income tax, operations and maintenance expense, administrative and general expense and insurance expense.

The cost projections for TVA are based on TVA's present cost of service methodology, which includes costs for operation and maintenance, administrative and general expenses, depreciation, payments in lieu of taxes, interest expense, allowance for funds used during construction (AFUDC), U.S. Treasury dividend payments, other expenses, and an allowance for margin.

The cost projections for SMEPA are based on SMEPA's present cost of service methodology, which includes allowances for costs of purchased power, transmission charges, operation and maintenance

expanses, interest expenses, depreciation, other expenses, and an allowance for margin.

Analysis of Transmission and Ancillary Service Rates

MEAG Power and Alston & Bird

The Firm was requested by MEAG Power to work with the law firm of Alston & Bird to review and investigate the filing made by the Southern Company regarding rates and charges for transmission and ancillary services. Services provided by R. W. Beck included:

- Review terms, conditions, and rates of the filed tariff to determine if they are just and reasonable.
- Assistance in the development of the intervention at the FERC, including providing affidavits from expert witnesses.
- Assistance in settlement negotiations, and economic evaluations of settlement proposals.

Development of Reciprocal Transmission Tariff, Transmission Rates, and Ancillary Service Rates

MEAG Power

The Firm was requested by MEAG Power to develop a transmission agreement and associated rates and charges for transmission and ancillary services that would allow MEAG Power to offer transmission service that would meet the reciprocity requirements of Order 888. Services provided by R. W. Beck included:

- Development of a MEAG Power transmission tariff, based on the Order 888 ProForma Tariff, that would meet reciprocity requirements while addressing the special requirements of a non-jurisdictional entity.
- Assistance in the functional unbundling of MEAG Power production, distribution, and transmission costs.
- Development of MEAG's 1997 rates for transmission and ancillary services, and development of the methodologies to be used by MEAG for determining subsequent rates.
- Assistance in the implementation of providing service under the new open access tariff arrangements.

Transmission System Ownership Negotiations

MEAG Power

MEAG Power (MEAG) is a joint owner of transmission facilities that comprise the Southern Companies transmission system. MEAG retained the services of R. W. Beck to assist in developing and negotiating revisions to the Integrated Transmission System (ITS) ownership and operation agreement with Southern Companies to incorporate the changes caused by new open access requirements. Services included:

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- Evaluating the functionality of facilities to determine if they are transmission or distribution related.
- Developing methods for crediting MEAG for its investment in transmission facilities.
- Developing proposed terms and conditions for joint ownership and use.
- Economic analysis of negotiating positions.

Analysis of Transmission and Ancillary Service Rates

North Carolina Eastern Municipal Power Agency and Spiegel & McDiarmid

The Firm was requested by the North Carolina Eastern Municipal Power Agency to work with the law firm of Spiegel & McDiarmid to review and investigate the rates for transmission service and ancillary services filed by Carolina Power & Light. Services provided by R. W. Beck included:

- Review terms, conditions, and rates of the filed tariff to determine if they are just and reasonable.
- Assistance in the development of the intervention at the FERC.
- Evaluations of the proposed transmission and ancillary service rates.
- Evaluations of the terms and conditions for ancillary services, including the proposed treatment of customer supplied ancillary services.
- Assistance in settlement negotiations, and economic evaluations of settlement proposals.

Analysis of Transmission and Ancillary Service Rates

North Carolina Municipal Power Agency No. 1, Piedmont Municipal Power Agency, and Spiegel & McDiarmid

The Firm was requested by the North Carolina Municipal Power Agency No. 1 and Piedmont Municipal Power Agency to work with the law firm of Spiegel & McDiarmid to review and investigate the rates for transmission service and ancillary services filed by Duke Power Company. Services provided by R. W. Beck included:

- Assistance in the development of the intervention at the FERC, including providing affidavits from expert witnesses.
- Review terms, conditions, and rates of the filed tariff to determine if they are just and reasonable.
- Evaluations of the proposed transmission and ancillary service rates.
- Evaluations of the terms and conditions for ancillary services, including the proposed treatment of customer supplied ancillary services.

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- Assistance in settlement negotiations, and economic evaluations of settlement proposals.

Power Supply and Related Services

North Carolina Eastern Municipal Power Agency

R. W. Beck was initially selected as Consulting Engineer to conduct preliminary power supply studies with respect to the development of the North Carolina Eastern Municipal Power Agency (NCEMPA) as a bulk power supplier, and to assist in negotiations with Carolina Power and Light Company regarding the purchase of generating capacity and interconnection services in the early 1980's. As Consulting Engineer, R. W. Beck has provided services in the areas of financings, budgeting, rates, load forecasting, contract administration, litigation support and ongoing power supply studies.

Over the years, R. W. Beck has supplied the following types of power supply related services to NCEMPA:

- Power supply planning studies
- Assistance with short- and long-term financings
- Assessment of specific demand side resources and supply side resources
- Long-term power cost projections
- Sensitivity analysis
- Interconnection agreement and power supply contract-related negotiations and expert testimony
- Development of central load monitoring and dispatch coordination system
- Rate analysis using probabilistic techniques
- Risk analysis using probabilistic techniques

Power Supply and Related Services

North Carolina Municipal Power Agency Number 1

R. W. Beck was initially selected as Consulting Engineer to conduct preliminary power supply studies with respect to the development of the North Carolina Municipal Power Agency Number 1 (Agency 1) as a bulk power supplier, and to assist in negotiations with Duke Power Company regarding the purchase of generating capacity and interconnection services in the early 1980's. As Consulting Engineer, R. W. Beck has provided services in the areas of financings, budgeting, rates, load forecasting, contract administration, litigation support and ongoing power supply studies.

Over the years, R. W. Beck has supplied the following types of power supply related services to Agency 1:

- Power supply planning studies
- Assistance with short- and long-term financings
- Assessment of specific demand side resources and supply side resources

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- Long-term power cost projections
- Sensitivity analysis
- Interconnection agreement and power supply contract-related negotiations and expert testimony
- Rate analysis using probabilistic techniques
- Risk analysis using probabilistic techniques
- Studies, market analyses and negotiations regarding the sale or exchange of surplus base-load capacity
- Studies, market analyses and negotiations regarding the purchase of seasonal capacity by the Power Agencies

Projected Participation in Regional Bulk Power Markets

MEAG Power

As part of the preparation of MEAG Power's projected operating results for the period 1997-2006, R. W. Beck developed projections of MEAG Power's generating resource operations and off-system transactions. These projections assumed MEAG Power would make sales to and purchases from a reregulated bulk power market. The methodology involved utilizing a regional generation dispatch model that incorporated major utilities in Florida, Georgia and South Carolina to produce projections of hourly "clearing prices" for capacity and energy in each interconnected market. These clearing prices include provisions for recovery of transmission wheeling and losses and a margin of profit for each transaction between MEAG Power and the power markets.

Stranded Cost Calculations

North Carolina Utilities

In connection with preparing for legislative proceedings regarding the restructuring of the electric utility industry, on a confidential basis, R.W. Beck prepared various stranded cost calculations for generating assets of several Power Agencies, Cooperatives, and investor-owned utilities in North Carolina. Calculations were performed using several methods including the two generally recognized approaches: (i) the "revenues lost approach", and (ii) the "income approach" (book less market value of assets).

In addition to performing order-of-magnitude calculations under different input assumptions, R.W. Beck compared and contrasted each of the various stranded cost calculations performed by others (e.g., Moody's, Resource Data International). Comparison of stranded cost calculations made by others revealed very different results and inconsistencies in methodology that were explained and reconciled.

Competitiveness Assessment and Strategic Planning

Piedmont Municipal Power Agency/South Carolina

R. W. Beck was retained by the Piedmont Municipal Power Agency (PMPA) to assist it in its Strategic Assessment. The purpose of

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PMPA's assessment was to develop a plan for enhancing the competitive position of its member systems.

Generally the consulting services provided by R. W. Beck included: (1) working with representatives of PMPA's Board of Directors, staff, legal counsel, financial advisor, and other members of the project team in conducting PMPA's strategic assessment process; (2) gathering information and preparing analyses regarding the potential effects on PMPA and others of the scenarios, alternatives, and action plans identified through the process, (3) assisting with preparation of documents, materials and reports that would be used to present the results of PMPA's strategic assessment efforts; and (4) meeting with PMPA's Board of Directors, city utility managers, appointed and elected city officials, and others to receive input for, and discuss results of, the work.

More specifically, during this extensive assignment, R. W. Beck assessed PMPA's and its members competitive situation, assisted in identifying alternative scenarios to be considered during PMPA's planning, and consulted regarding the planning process to be used. R. W. Beck also performed studies regarding the potential market price of electricity, value of assets, and effects of financing, power supply, and other options on the member systems' revenue requirements. Scenario planning, systems thinking, and probabilistic analytical techniques were used in assessing the competitive situation and the potential impacts of alternative strategies.

Power Supply and Related Services

Alabama Municipal Electric Authority

Alabama Municipal Electric Authority ("AMEA") is a public corporation of the State of Alabama which was incorporated in 1981. AMEA consists of eleven municipal utility systems, each of which owns and operates a distribution system.

As the Consulting Engineer to AMEA, R. W. Beck was retained to help negotiate and analyze a proposed purchase of long-term, firm system power from the Alabama Power Company ("APCO") by AMEA as its initial supply project, and to evaluate the establishment by AMEA of its Power Supply System. The analysis included preparing a description of the project; projected financing costs; and projected annual power costs under the existing and alternative arrangement. Sensitivity cases were also prepared to evaluate changes in major assumptions. Power cost projections for purchases from APCO were also prepared to evaluate AMEA's projected power cost under the existing and alternative arrangement.

As part of its services, the Firm assisted AMEA in developing the required contract documents between the participants and AMEA and between AMEA and APCO. In addition, the Firm worked with AMEA's staff and other consultants on activities necessary to finance the purchase prepayment. As part of the financing, R. W. Beck

developed the Consulting Engineer's Report that was included in AMEA's Official Statement. The firm has assisted AMEA in the development of several request for proposal (RFP) processes that led to a second power arrangement with APCO and a 10-year peaking power purchase from a subsidiary of Entergy, Inc.

Duke Power Open Access Transmission Filings

North Carolina Municipal Power Agency (NCMPA No. 1) and Piedmont Municipal Power Agency (PMPA)

R. W. Beck was retained by NCMPA No. 1 and the PMPA regarding the open access transmission filings by Duke Power Company. Services provided by the Firm included:

- Review of the terms, conditions and rates for transmission and ancillary services to determine if they are just and reasonable.
- Development of positions and economic analyses for use in the intervention filing at the FERC.
- Develop of negotiation positions, economic analyses of alternatives, and assisting in settlement negotiations.

Stranded Cost Calculations

Georgia Utilities

R. W. Beck conducted a three-phased study of the stranded cost exposure of utilities in Georgia, including MEAG Power, Georgia Power, and Oglethorpe. In the first phase, stranded cost calculations that had been prepared by others were summarized, categorized (with regard to methodology and major assumptions), and compared. On a confidential basis, Phase II and Phase III were conducted to develop stranded cost estimates and stranded investment estimates for the major electric utilities in Georgia, and to develop representative levels of possible Competition Transition Charges based on assumptions with respect to the future treatment of stranded cost recovery in Georgia. Analyses were performed to estimate the sensitivity of results to factors such as market price projections and the assumed year of open competition and full customer choice in Georgia.

Strategies to Prepare for Competition

MEAG Power, Georgia

R. W. Beck has worked with MEAG Power since 1997 to develop strategies to prepare for competition. In 1997, R. W. Beck assisted MEAG Power in the development of its new power supply arrangement with Georgia Power Company, which provided MEAG Power with greater control with respect to commitment and dispatching of its generating facilities and more flexibility to make purchases and sales in external markets. Also in 1997, R. W. Beck prepared a letter report summarizing its findings on the potential benefits of MEAG Power's participation in The Energy Authority, an

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alliance among MEAG Power, Santee Cooper, and Jacksonville Electric Authority that began operations May 1997.

Beginning in early 1998, R. W. Beck has helped MEAG Power develop and evaluate potential strategies to reduce the stranded costs of the Authority and the member Participants. The goal of the strategies is to provide equity funds that would be used to reduce stranded costs by retirement of bonds and/or establishing funds to offset future above market costs. Strategies that were considered include a combination of Agency and Participant initiatives involving rate strategies, use of certain reserves, asset sales, use of Participant equity funds, and distribution sale/lease arrangements (to replace generation debt with "wires" debt). R. W. Beck performed various analyses to evaluate initiatives with respect to the bond resolutions, the power sales contracts, sellback agreements and Participant budgeting and billing processes. MEAG Power is currently presenting to its member cities the Participant Equity Program, which outlines strategies and conveys the potential effects on an individual Participant basis.

Stranded Cost Assessment

Piedmont Municipal Power Agency (PMPA)

R. W. Beck was retained by PMPA to assess PMPA's exposure to costs related to its share of the Catawba Nuclear Station becoming stranded in the event retail wheeling is implemented in South Carolina. PMPA used the results of the study during discussions of potential industry restructuring proposals with State legislature and regulatory officials and the South Carolina Public Service Authority.

The analyses performed included:

- Projecting the value of PMPA's share of the output from Catawba based on projections of future market prices for wholesale energy;
- Projecting costs of the Catawba Project; and
- Computing PMPA's stranded cost exposure under various scenarios structured to evaluate uncertainties regarding: (1) the methods that may be specified by regulators for projecting stranded costs; (b) future project ownership; (c) future fuel prices (coal, oil, gas, and nuclear); and (d) future operating expense levels.

Stranded Cost Assessment

North Carolina Eastern Municipal Power

R. W. Beck was retained by NCEMPA to perform a preliminary analysis of the exposure of NCEMPA to the potential level of stranded costs associated with the potential loss of certain wholesale customers. The analytical approach adopted multiple-scenario analyses involving high-, mid-, and low-range estimates of stranded costs based upon a revenues lost methodology. For the high-end stranded cost range, regional marginal energy costs (without a

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capacity component) were developed as a proxy for the lowest practical market price for power. The mid-range estimate utilized this marginal energy cost plus a capacity component reflecting the costs of combustion turbines. For the low-end range for stranded costs, the market price for power was assumed equal to the prevailing estimates of wholesale power costs from competing regional investor-owned utilities. Stranded costs were assessed over a variety of assumed applicable recovery time periods, spanning from 5 to 20 years.

Southern Companies Open Access Transmission Filing

Municipal Transmission Users

R. W. Beck was retained by a group of five municipal utilities that use the Southern Companies transmission system to perform the following services:

- Review the terms and conditions of the filed tariffs to determine if they are just and reasonable.
- Evaluate the filed rates for transmission and ancillary services and develop adjustments necessary to correct potential overcharges.
- Develop points and issues to be used in interventions by each of the customers.
- Develop negotiation strategies and positions.

Doswell Combined-Cycle Facility

Credit Suisse, Ashland, Virginia

The facility was designed and built to deliver electric power to the Virginia Electric and Power Company using two gas-fired combined-cycle units. Each unit is comprised of two Siemens V84.2 gas turbine-generators with waste heat recovery boilers, one ABB steam turbine-generator with an air-cooled condenser, and associated auxiliary equipment. The facility is one of the largest independent power projects in the United States, with a capacity of over 700 MW.

As part of an independent engineering review of the project, R. W. Beck reviewed power purchase agreements, utilities and fuel supplies, engineering, procurement and construction, operation and maintenance, permitting and environmental aspects, performance testing, and long-term performance potential.

Services included:

- Review of technology
- Fuel supply and composition analysis
- Review of power purchase contract
- Review of Engineering, Procurement, and Construction Agreement
- Permitting and environmental review
- Review of Operations and Maintenance Agreement
- Projection of operating results

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- Construction monitoring
- Start-up and performance test monitoring
- Analyzed performance test results
- Annual reviews of operation and maintenance

VEPCo Generating Assets – Stranded Cost Evaluation

Christian and Barton, L.L.P.

R. W. Beck was engaged by Christian & Barton, L.L.P. to perform a limited evaluation of the stranded costs associated with Virginia Electric and Power Company's ("VEPCo") generating assets, assuming divestiture of such assets. More specifically, we were asked by Christian & Barton to apply sales price-to-book value ratios associated with recent sales of fossil and nuclear plants to the book value of the VEPCo assets in order to produce a range of the estimated market value for each generating asset group. The estimated market value range was then compared to the book value of the VEPCo generating assets in aggregate in order to determine a range of potential "net" stranded costs under a divestiture scenario. The results were summarized in a letter report to the client.

Phase II - Power Supply Study

Louisiana Energy and Power Authority

R. W. Beck conducted a power supply study for the Louisiana Energy and Power Authority ("LEPA"). This study was a continuation of the work performed in the Econometric Load Model, Capacity and Fuel Study -- Phase I. This study included the following services:

- Agency and Member Load Forecasting
- Least Cost Planning Analyses
- Development of Computer Models
- Fuel Forecasting

LEPA is a joint action agency of 16 municipalities throughout Louisiana. In conducting this study, the Consulting Engineer (i) updated the computer-based econometric load model initially developed in Phase I; (ii) reviewed existing member-owned generation capacity; (iii) forecasted future fuel costs for gas, coal and lignite; (iv) developed computer models for existing and future purchased power contracts; (v) developed future transmission costs based on transmission expansion plans of LEPA's transmission providers; (vi) screened potential resource options using a strategic planning generating resource computer model; (vii) developed alternative power supply plans based on the production costs for each resource option in the LEPA system and for the entire LEPA system using a capacity expansion and production cost computer model; and (viii) examined the costs and benefits associated with each alternative resource expansion plan, resulting in the selection of a plan, based on least cost planning principals, which optimized the benefits received by LEPA.

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Ancillary Service – Definition, Pricing, and Rationale

Southwestern Power Administration

To conform to Order 888 mandates, the Southwestern Power Administration (SWPA) was developing new open access transmission rates. SWPA lacked sufficient information for developing rates for ancillary services and retained R. W. Beck to develop alternative pricing methodology for (1) scheduling system control and dispatch, (2) reactive supply and voltage control, (3) regulation and frequency response, (4) energy imbalance, (5) spinning reserves, and (6) supplemental reserves. R. W. Beck developed a manual for pricing options of their services, including the pros and cons of specific methods, the rationale for particular approaches, and our experience with particular issues at FERC proceedings. We also advised SWPA on potential transmission rate terms and conditions that may be applicable to ancillary service rates for SWPA.

Section 4

TRANSMISSION MODELING EXPERIENCE

R. W. Beck has extensive experience in performing transmission system load flow and stability analyses for transmission systems throughout the U.S. We have also been responsible for reviewing and developing transmission and ancillary service tariffs and have assisted with several interventions on open access transmission filings before FERC. In fact, R. W. Beck's work in the area of obtaining open access to transmission systems helped lead to FERC's development and issuance of Order 888.

R. W. Beck has been engaged to perform over 100 transmission analysis studies since 1998. These studies have included generator siting analyses, transmission constraint analyses, fatal flaw load flow analyses (used to examine the impact on the system of integrating a new generating plant), and transmission evaluations relating to congestion management. We have a multi-faceted approach to transmission evaluation, i.e., a mixture of technical analyses and theoretical evaluation, that we believe provides a more rounded useful work product. We supplement technical analyses with discussions on issues pertaining to bulk transmission flows (e.g., what causes transmission constraints and what impact new generation may have on existing limitations).

R. W. Beck has provided a full range of transmission related consulting services associated with the location of generation resources. Such studies have included the following:

- Site Selection and Evaluation
- Fatal Flaw Transmission Analyses
- Development of Interconnection Alternatives
- Determination of Transmission Upgrades
- Transmission Constraint Evaluations
- Market Price/Congestion Management Dispatch Analyses
- Analyses of the impact on the system of Transmission Upgrades
- Planning and Feasibility Studies
- Technical Review of System Impact Studies
- Cost Estimates for Transmission Upgrades
- Generator Interconnection Procedure Assistance
- Transmission Loss Analyses
- FERC Expert Witness Testimony

CLIENT LIST

Below is a partial client list for the more than 100 transmission analyses we've performed since 1998:

- American National Power

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TRANSMISSION MODELING EXPERIENCE

- Arizona Public Service
- Calpine Eastern Corp
- Cogentrix Energy
- Competitive Power Ventures
- Conoco
- Constellation Power
- Duke Energy
- FPL Energy
- Illinova Generating Co
- Irving Oil
- Lea County
- Panda Energy International
- SEMPRA
- Spiegel and McDiarmid -AEGIS
- Sprague Energy
- Westcoast Power, Inc
- Western Kentucky Energy

PROJECT PROFILES

Below are selected project profiles demonstrating R. W. Beck's relevant experience in Florida and SERC.

Generation Siting/Transmission Requirements Study

Confidential Power Developers Various Locations

R. W. Beck has been contracted by Independent Power Producers to perform system wide fatal flaw load flow analyses to determine the impact of proposed merchant plant generation resources on the regional and bulk transmission systems in SERC. Additionally, R. W. Beck has worked with developers to coordinate generator interconnection requirements, reviewed the results of the host utility performed System Impact and Facilities Studies, and when necessary worked to develop alternative interconnection or plant configuration to minimize the impact on the transmission grid. R. W. Beck has also performed extensive evaluations of the regions surrounding SERC including SPP, MAIN, ERCOT and FRCC. In evaluating these regions it is often necessary to examine the ability to transfer power between these regions as well as explore transmission constraints.

The evaluations have included (i) preliminary design of interconnections to interconnect 270 to 2600 MW generating stations

to the transmission grid based on the transmission system configuration and potential site locations (ii) using load flow analyses, examination of the impact on the grid of interconnecting the proposed resource at various sites to determine the optimum electrical site, interconnection alternative and the potential of the project to sell to various load centers, (ii) determination of necessary system additions/improvements necessary to integrate the project(s) (iii) ballpark cost estimates to integrate the resource and (iv) discussion of various transmission issues, e.g., the relationship between the proposed plant and existing transmission system constraints.

The projects included:

- Creation of Base Case load flow models from the FERC 715 filing database of cases which reflect planned improvements to the transmission system and other publicly announced generation projects not included in the FERC model.
- Development of power flow case models for various generation levels and system configurations and interconnection alternatives.
- Contingency analysis of all alternatives.
- Coordination of transmission line routing.
- Development of cost estimates for each alternative.
- Outline of system improvements necessary to integrate the resource.
- Discussion of factors relating to integration of the project at various locations such as historical and/or potential bulk system transmission constraints.

Transmission Fatal Flaw Analysis

Confidential Client

R. W. Beck performed a fatal flaw load flow analysis for a confidential developer in the State of Florida. The analysis was performed to determine if upgrades to the existing transmission system would be required to incorporate the added generation in the region. Three sites were studied that included regions of three different investor-owned utilities. The plant sizes ranged from a few hundred to nearly a thousand megawatts. Load flow cases filed under FERC Form 714 were used and modified for the analysis using GE's PSLF software. The study included a review of proposed future generating plants, regional planning criteria, and single contingency load excursions on transmission lines and power transformers.

Transmission and Distribution System Study

City of Tallahassee, Florida

The study scope included distribution primary analysis of the existing and short-term (3-5 years) distribution system configuration, along

with recommendations for circuit reconductoring, load balancing and line capacitor additions. Also included was existing, short and long-range (10-year) transmission load flow analysis. The load flow analysis focused on solutions and recommendations for improvement of the bulk transmission system. All recommendations included cost estimates for budgeting purposes and the development of a long-range plan. Also included in the study scope was a fault study of the transmission and distribution systems.

Transmission and Distribution System Study

City of Vero Beach, Florida

R. W. Beck analyzed existing transmission and distribution systems for the City of Vero Beach based on the city's load projections and developed recommendations for system expansion for 5 and 10 year planning horizons. The project also included a protective device coordination study and construction cost estimates of the recommended improvements.

Vero Beach/Fort Pierce 69 kV Tie-Line Study

City of Vero Beach, Florida

The project consisted of an analysis of existing 69 kV tie-line between the two cities, analysis of impacts of growth on the viability of the existing line, and analysis of possible alternatives. The study provided three alternatives with associated cost estimates and a recommendation of a preferred alternative. The final report was completed in June 1990.

Summary of Committed and Uncommitted Resources
Summer

Line	Uncommitted Resources [1]		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	SEC	Unknown	-	-	150	150	150	150	150	150	150	150
2	SEC	Unknown	-	-	150	150	150	150	150	150	150	150
3	JEA	Brandy Branch	-	-	149	149	149	149	149	149	149	149
4	FKEC	Marathon	-	-	4	4	4	4	4	4	4	4
5	JEA	Brandy Branch	-	-	-	149	149	149	149	149	149	149
6	FPL	Sanford RP [2]	-	-	-	202	927	927	927	927	927	927
7	SEC	Unknown	-	-	-	-	150	150	150	150	150	150
8	SEC	Unknown	-	-	-	-	150	150	150	150	150	150
9	SEC	Unknown	-	-	-	-	150	150	150	150	150	150
10	SEC	Unknown	-	-	-	-	150	150	150	150	150	150
11	SEC	Unknown	-	-	-	-	-	150	150	150	150	150
12	SEC	Unknown	-	-	-	-	-	150	150	150	150	150
13	TECO	Polk	-	-	-	-	-	155	155	155	155	155
14	LAKE	Mcintosh	-	-	-	-	-	238	238	238	238	238
15	FPC	Hines Energy Complex	-		-	-	-	-	495	495	495	495
16	SEC	Unknown	-	-	-	-	-	-	150	150	150	150
17	TECO	Polk	-	-	-	-	-	-	155	155	155	155
18	JEA	Brandy Branch	-	-	-	-	-	-	149	149	149	149
19	SEC	Unknown	-	-	-	-	-	-	-	150	150	150
20	FPL	Martin	-	-	-	-	-	-	-	419	419	419
21	FPC	Hines Energy Complex	-	-	-	-	-	-	-	-	495	495
22	SEC	Unknown	-	-	-	-	-	-	-	-	150	150
23	FMPA	Cane Island	-	-	-	-	-	-	-	-	80	80
24	FPL	Martin	-	-	-	-	-	-	-	-	419	419
25	TECO	Polk	-	-	-	-	-	-	-	-	155	155
26	JEA	Unknown	-	-	-	-	-	-	-	-	149	149
27	SEC	Unknown	-	-	-	-	-	-	-	-	-	150
28	FPL	Unknown	-	-	-	-	-	-	-	-	-	419
29	TECO	Polk	-	-	-	-	-	-	-	-	-	155
30		Total Uncommitted Additions	-	-	453	804	2,129	2,822	3,771	4,340	5,788	6,512
	Additional Committed Resources [3]											
31	TPS - Hardee	CT	-	-	75	75	75	75	75	75	75	75
32	Duke/New Smyrna	CC	-	-	-	476	476	476	476	476	476	476
33	Thermo Ecotek (Lakeworth Gen)	RP	-	-	-	260	260	260	260	260	260	260
34	Reliant - Holopaw	CT	-	-	-	460	460	460	460	460	460	460
35	Constellation - Oleander	CT	-	-	-	850	850	850	850	850	850	850
36	IPS/Avon Park	CT	-	-	-	680	680	680	680	680	680	680
37	PG&E - Okeechobee	CC	-	-	-	-	510	510	510	510	510	510
38	Panda - Leesburg	CC	-	-	-	-	1,100	1,100	1,100	1,100	1,100	1,100
39	Panda - Midway	CC	-	-	-	-	1,100	1,100	1,100	1,100	1,100	1,100
40	FPL Sanford Repowering [4]	RP	-	-	-	-	1,132	1,132	1,132	1,132	1,132	1,132
41		Total Commited Additions	-	-	75	2,801	6,643	6,643	6,643	6,643	6,643	6,643

[1] Projects reported in the FRCC 1999 Regional Load & Resource Plan which have not submitted petitions for certificate of need or which have not been permitted for air quality or construction.

[2] Based on information contained in FPL's Ten-Year Site Plan and recent information made public by FPL, the project to repower units 3 and 4 has been changed to reflect a repowering of units 4 and 5.

[3] Projects which were not reported in the FRCC 1999 Regional Load & Resource Plan that have submitted petitions for certificate of need, or if not required to submit such petition, projects that have received air quality and/or construction permits.

[4] Reflects repowering units 4 and 5.

Summary of Committed and Uncommitted Resources
Winter

Line	Uncommitted Resources [1]			1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	SEC	Unknown		-	-	150	150	150	150	150	150	150	150
2	SEC	Unknown		-	-	150	150	150	150	150	150	150	150
3	JEA	Brandy Branch		-	-	186	186	186	186	186	186	186	186
4	JEA	Brandy Branch		-	-	-	186	186	186	186	186	186	186
5	FKEC	Marathon		-	-	-	4	4	4	4	4	4	4
6	FPL	Sanford RP [2]		-	-	-	182	1,101	1,101	1,101	1,101	1,101	1,101
7	SEC	Unknown		-	-	-	-	150	150	150	150	150	150
8	SEC	Unknown		-	-	-	-	150	150	150	150	150	150
9	SEC	Unknown		-	-	-	-	150	150	150	150	150	150
10	SEC	Unknown		-	-	-	-	150	150	150	150	150	150
11	SEC	Unknown		-	-	-	-	-	150	150	150	150	150
12	SEC	Unknown		-	-	-	-	-	150	150	150	150	150
13	TECO	Polk		-	-	-	-	-	180	180	180	180	180
14	LAKE	Mcintosh		-	-	-	-	-	-	238	238	238	238
15	FPC	Hines Energy Complex		-	-	-	-	-	-	587	587	587	587
16	SEC	Unknown		-	-	-	-	-	-	150	150	150	150
17	TECO	Polk		-		-	-	-	-	180	180	180	180
18	JEA	Brandy Branch		-	-	-	-	-	-	-	186	186	186
19	SEC	Unknown		-	-	-	-	-	-	-	150	150	150
20	FPL	Martin		-	-	-	-	-	-	-	448	448	448
21	FPC	Hines Energy Complex		-	-	-	-	-	-	-	-	567	567
22	SEC	Unknown		-	-	-	-	-	-	-	-	150	150
23	FMPA	Cane Island		-	-	-	-	-	-	-	-	80	80
24	FPL	Martin		-	-	-	-	-	-	-	-	448	448
25	TECO	Polk		-	-	-	-	-	-	-	-	180	180
26	JEA	Unknown		-	-	-	-	-	-	-	-	-	186
27	SEC	Unknown		-	-	-	-	-	-	-	-	-	150
28	FPL	Unknown		-	-	-	-	-	-	-	-	-	448
29	TECO	Polk		-	-	-	-	-	-	-	-	-	180
30		Total Uncommitted Additions		-	-	486	858	2,377	2,857	4,012	4,796	6,221	7,185
	Additional Committed Resources [3]												
31	TPS - Hardee		CT	-	-	75	75	75	75	75	75	75	75
32	Duke/New Smyrna		CC	-	-	-	548	548	548	548	548	548	548
33	Thermo Ecotek (Lakeworth Gen)		RP	-	-	-	260	260	260	260	260	260	260
34	Reliant - Holopaw		CT	-	-	-	460	460	460	460	460	460	460
35	Constellation - Oleander		CT	-	-	-	910	910	910	910	910	910	910
36	IPS/Avon Park		CT	-	-	-	-	680	680	680	680	680	680
37	PG&E - Okeechobee		CC	-	-	-	-	-	560	560	560	560	560
38	Panda - Leesburg		CC	-	-	-	-	-	1,150	1,150	1,150	1,150	1,150
39	Panda - Midway		CC	-	-	-	-	-	1,150	1,150	1,150	1,150	1,150
40	FPL Sanford Repowering [4]		RP	-	-	-	202	1,342	1,342	1,342	1,342	1,342	1,342
41		Total Committed Additions		-	-	75	2,455	4,275	7,135	7,135	7,135	7,135	7,135

[1] Projects reported in the FRCC 1999 Regional Load & Resource Plan which have not submitted petitions for certificate of need or which have not been permitted for air quality or construction.

[2] Based on information contained in FPL's Ten-Year Site Plan and recent information made public by FPL, the project to repower units 3 and 4 has been changed to reflect a repowering of units 4 and 5.

[3] Projects which were not reported in the FRCC 1999 Regional Load & Resource Plan that have submitted petitions for certificate of need, or if not required to submit such petition, projects that have received air quality and/or construction permits.

[4] Reflects repowering of Sanford units 4 and 5.

FRCC
Summary of Capacity, Demand & Reserve Margin
Summer Peak
(Megawatts)

Case 1: FRCC 1999 Regional Load and Resource Plan

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
		Total				Total	Reserve Margin w/o Load Management			Reserve Margin with Load Management	
Line	Year	Available Capacity				Peak Demand	Percent	MW	Firm Peak Demand	Percent	MW
1	2003	44,484				39,781	11.8%	4,703	36,988	20.3%	7,496
2	2004	44,921				40,593	10.7%	4,328	37,804	18.8%	7,117
3	2005	45,772				41,433	10.5%	4,339	38,638	18.5%	7,134
4	2006	46,208				42,398	9.0%	3,810	39,597	16.7%	6,611
5	2007	47,651				43,252	10.2%	4,399	40,443	17.8%	7,208
6	2008	48,350				44,066	9.7%	4,284	41,266	17.2%	7,084

Case 2: Committed Projects Excluding Panda

		Total	Less	Plus Additional	Adjusted	Total	Reserve Margin w/o Load Management			Reserve Margin with Load Management	
	Year	Available Capacity	Uncommitted Resources	Committed Resources	Available Capacity	Peak Demand	Percent	MW	Firm Peak Demand	Percent	MW
7	2003	44,484	2,129	4,443	46,798	39,781	17.6%	7,017	36,988	26.5%	9,810
8	2004	44,921	2,822	4,443	46,542	40,593	14.7%	5,949	37,804	23.1%	8,738
9	2005	45,772	3,771	4,443	46,444	41,433	12.1%	5,011	38,638	20.2%	7,806
10	2006	46,208	4,340	4,443	46,311	42,398	9.2%	3,913	39,597	17.0%	6,714
11	2007	47,651	5,788	4,443	46,306	43,252	7.1%	3,054	40,443	14.5%	5,863
12	2008	48,350	6,512	4,443	46,281	44,066	5.0%	2,215	41,266	12.2%	5,015

Case 3: Committed Projects Including Panda

		Total	Less	Plus Additional	Adjusted	Total	Reserve Margin w/o Load Management			Reserve Margin with Load Management	
	Year	Available Capacity	Uncommitted Resources	Committed Resources	Available Capacity	Peak Demand	Percent	MW	Firm Peak Demand	Percent	MW
13	2003	44,484	2,129	6,643	48,998	39,781	23.2%	9,217	36,988	32.5%	12,010
14	2004	44,921	2,822	6,643	48,742	40,593	20.1%	8,149	37,804	28.9%	10,938
15	2005	45,772	3,771	6,643	48,644	41,433	17.4%	7,211	38,638	25.9%	10,006
16	2006	46,208	4,340	6,643	48,511	42,398	14.4%	6,113	39,597	22.5%	8,914
17	2007	47,651	5,788	6,643	48,506	43,252	12.1%	5,254	40,443	19.9%	8,063
18	2008	48,350	6,512	6,643	48,481	44,066	10.0%	4,415	41,266	17.5%	7,215

Notes:

Col. (b),	FRCC 1999 Regional Load & Resource Plan, page 22, col. 5
Col. (c),	Exhibit PAA-3,"Total Uncommitted Additions."
Col. (d),	lines 7 - 12, Exhibit PAA-3, "Total Committed Additions" less Panda Projects, summer rating (2,200 MW)
Col. (d),	lines 13 - 18, Exhibit PAA-3, "Total Committed Additions."
Col. (e),	Col. (b)-Col. (c)+ Col. (d)
Col. (f),	FRCC 1999 Regional Load & Resource Plan, page 1, col. 2
Col. (g),	Col. (h)/Col. (f).
Col. (h),	Col. (e)-Col. (f).
Col. (i),	FRCC 1999 Regional Load & Resource Plan, page 22, col. 9
Col. (j),	Col. (k)/Col. (i).
Col. (k),	Col. (e)-Col. (i).

FRCC
Summary of Capacity, Demand & Reserve Margin
Winter Peak
(Megawatts)

Case 1: FRCC 1999 Regional Load and Resource Plan

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
		Total				Total	Reserve Margin w/o Load Management			Reserve Margin with Load Management	
Line	Year	Available Capacity				Peak Demand	Percent	MW	Firm Peak Demand	Percent	MW
1	2003/04	47,213				43,726	8.0%	3,487	39,663	19.0%	7,550
2	2004/05	48,125				44,651	7.8%	3,474	40,566	18.6%	7,559
3	2005/06	48,776				44,553	9.5%	4,223	41,450	17.7%	7,326
4	2006/07	50,195				46,600	7.7%	3,595	42,476	18.2%	7,719
5	2007/08	51,144				47,502	7.7%	3,642	43,374	17.9%	7,770

Case 2: Committed Projects Excluding Panda

							Plus Reserve Margin w/o Load Management				
		Total Available	Less Uncommitted	Additional Committed	Adjusted Available	Total Peak				Reserve Margin with Load Management	
	Year	Capacity	Resources	Resources	Capacity	Demand	Percent	MW	Firm Peak Demand	Percent	MW
6	2003/04	47,213	2,857	4,835	49,191	43,726	12.5%	5,465	39,663	24.0%	9,528
7	2004/05	48,125	4,012	4,835	48,948	44,651	9.6%	4,297	40,566	20.7%	8,382
8	2005/06	48,776	4,796	4,835	48,815	44,553	9.6%	4,262	41,450	17.8%	7,365
9	2006/07	50,195	6,221	4,835	48,809	46,600	4.7%	2,209	42,476	14.9%	6,333
10	2007/08	51,144	7,185	4,835	48,794	47,502	2.7%	1,292	43,374	12.5%	5,420

Case 3: Committed Projects Including Panda

							Plus Reserve Margin w/o Load Management				
		Total Available	Less Uncommitted	Additional Committed	Adjusted Available	Total Peak				Reserve Margin with Load Management	
	Year	Capacity	Resources	Resources	Capacity	Demand	Percent	MW	Firm Peak Demand	Percent	MW
11	2003/04	47,213	2,857	7,135	51,491	43,726	17.8%	7,765	39,663	29.8%	11,828
12	2004/05	48,125	4,012	7,135	51,248	44,651	14.8%	6,597	40,566	26.3%	10,682
13	2005/06	48,776	4,796	7,135	51,115	44,553	14.7%	6,562	41,450	23.3%	9,665
14	2006/07	50,195	6,221	7,135	51,109	46,600	9.7%	4,509	42,476	20.3%	8,633
15	2007/08	51,144	7,185	7,135	51,094	47,502	7.6%	3,592	43,374	17.8%	7,720

Notes:

Col. (b),	FRCC 1999 Regional Load & Resource Plan, page 22, col. 5.
Col. (c),	Exhibit PAA-4,"Total Uncommitted Additions."
Col. (d),	lines 6 - 10, Exhibit PAA-4, "Total Committed Additions" less Panda Projects, winter rating (2,300 MW).
Col. (d),	lines 11 - 15, Exhibit PAA-4, "Total Committed Additions."
Col. (e),	Col. (b)-Col. (c)+ Col. (d).
Col. (f),	FRCC 1999 Regional Load & Resource Plan, page 1, col. 7.
Col. (g),	Col. (h)/Col. (f).
Col. (h),	Col. (e)-Col. (f).
Col. (i),	FRCC 1999 Regional Load & Resource Plan, page 22, col. 9.
Col. (j),	Col. (k)/Col. (i).
Col. (k),	Col. (e)-Col. (i).

Determination of Need Application
Panda Energy International Inc.

Comparison of Generation Alternatives

Line No.	Financial/Economic Assumptions	
1	Interest Rate	8.0%
2	Debt Percent	65.0%
3	Equity Rate	13.0%
4	Tax Rate	35.0%
5	General Infl Rate	0.00%
6	Biomass	0.00%
7	Coal Infl. Rate	-1.22%
8	Gas Infl Rate	1.13%
9	None	0.00%
10	Nuclear Infl rate	0.00%
11	Oil Infl Rate	0.55%
12	Solar	0.00%

Fixed Chg Rates:	Life	Percent
15 years	15	14.53%
20 Years	20	13.25%
25 Years	25	12.16%
30 years	30	11.49%
40 years	40	10.77%

Fixed charges Calculated on separate worksheet

Emission Costs:		
NOx	2000	$/ton
SO2	150	$/ton

(All dollar values expressed in 2000$)

	Type	Source	Cap.	Installed Cost	Heat Rate	NOx	SO2	Fuel Cost	Fuel Type	Fuel Cost	Fixed O&M [9]	VAR. O&M	Emission Costs	Life	Carrying Charge	Annualized Cost 10%CF	50%CF	90%CF
			(MW)	($/kW)	(BTU/kWh)	(lb/MWh)	(lb/MWh)	($/MMBtu)		($/MWh)	($/kW-yr)	($/MWh)	($/MWh)	Years	%	$/MWh	$/MWh	$/MWh
			(a)	(b)	(c)	(d)	(e)	(f)	(g)	(k)	(l)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Steam - Coal																	
13	Pressurized CFB	1	379.2	1,148	7,269	0.7	1.7	1.66	coal	12.07	30.9	2.9	0.9	30	0.1149	200.42	51.65	35.12
14	Subcritical Pulverized Coal	1	397.5	1,281	9,077	4.1	3.1	1.66	coal	15.07	23.8	2.3	4.3	30	0.1149	215.11	59.00	41.65
15	Supercritical Pulverized Coal	1	401.8	1,331	8,568	1.4	1.5	1.66	coal	14.22	24.4	3.7	1.5	30	0.1149	220.14	58.20	40.20
16	Ultracritical Pulverized Coal	1	399.7	1,326	8,251	1.4	1.4	1.66	coal	13.70	24.4	2.3	1.5	30	0.1149	217.63	56.23	38.30
	IGCC Technology																	
17	Foak Oxygen Blown-IGCC	1	543.2	1,471	8,522	0.2	0.5	1.66	coal	14.15	32.7	1.7	0.2	30	0.1149	244.73	60.50	40.03
18	Inter. Oxygen-Blown IGCC	1	349.2	1,407	7,513	0.2	0.1	1.66	coal	12.47	37.2	2.0	0.2	30	0.1149	240.20	58.62	38.44
19	Adv. Air-Blown IGCC	1	398.1	1,119	6,870	0.2	0.1	1.66	coal	11.40	32.8	1.7	0.2	30	0.1149	196.14	48.78	32.41
20	Adv. Oxygen-Blown IGCC	1	427.7	1,245	6,968	0.2	0.1	1.66	coal	11.57	34.2	1.9	0.2	30	0.1149	214.68	52.78	34.79
	Steam - Nuclear																	
21	Nuclear , Passive Adv. LWR	2	600	1,841	10,400	-	-	0.46	nuclear	4.78	44.9	0.5	0.0	40	0.1077	282.83	60.82	36.15
	Steam - Gas																	
22	Gas-fired steam tubine	3	1727	671 [1]	10,310	0.2 [2]	neg. [2]	2.82	gas	29.06		2.6 [3]	0.2	30	0.1149	123.56	53.14	45.31
	Renewable Energy																	
23	Phosphoric Acid Fuel Cell	5	0.2	4,280	9,980	-	-	2.82	gas	28.13	344.5	0.9	-	20	0.1325	1072.39	239.86	147.36
24	Molten Carbonate Fuel Cell	2	2	1,631	6,640	-	-	2.82	gas	18.72	6.8	1.5	-	30	0.1149	244.21	66.89	47.19
25	Solar Parabolic Trough	6	80	2,867	-	-	-	-	solar	-	66.8	-	-	30	0.1149	452.33	90.47	#N/A
26	Utility-Scale PV Concentrators	6	2.5	5,066	-	-	-	-	solar	-	59.4	-	-	30	0.1149	732.58	146.52	#N/A
27	Utility-Scale Flat-Plate PV	6	2.4	5,620	-	-	-	-	solar	-	-	8.2	-	30	0.1149	745.28	155.59	#N/A
28	Wind Energy	6	37.5	795	-	-	-	-	none	-	14.7	-	-	30	0.1149	121.10	#N/A	#N/A
29	Gasification-Based Biomass	6	75	2,006	10,000	Not Determined		2.5	biomass	25.00	46.0	3.8	-	30	0.1149	344.51	91.97	63.91
30	Waste to Energy-Mass Burn	5	50	2,610	15,500	Not Determined		-	solid waste	0.00	130.5	39.1	-	30	0.1149	530.43	137.40	93.73
31	Waste to Energy-RDF unit	5	50	3,132	17,000	Not Determined		-	refuse	0.00	182.7	39.1	-	30	0.1149	658.48	163.01	107.96

Notes:

See Page 2 of 2 for notes.

Determination of Need Application
Panda Energy International Inc.

Comparison of Generation Alternatives

(All dollar values expressed in 2000$)

	Type	Source	Cap.	Installed Cost	Heat Rate	NOx	SO2	Fuel Cost	Fuel Type	Fuel Cost	Fixed O&M	VAR O&M	Emission Costs	Life	Carrying Charge	Annualized Cost 10%CF	50%CF	80%CF
			(MW)	($/kW)	(BTU/kWh)	(lb/MWh)	(lb/MWh)	($/MMBtu)		($/MWh)	($/kW-yr)	($/MWh)	($/MWh)	Years	%	$/MWh	$/MWh	$/MWh
			(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
	Combined Cycle - Gas Fired																	
32	GE 7EA 1x1	4	130	660 [4]	7550	0.7 [5]	neg. [6]	2.82	gas	21.26	3.4 [7]	2.5 [7]	0.7	30	0.1149	117.59	45.23	37.19
33	GE 7EA 2x1	4	264	563 [4]	7440	0.7 [5]	neg. [6]	2.82	gas	20.97	2.3 [7]	2.3 [7]	0.7	30	0.1149	103.14	41.88	35.07
34	Westinghouse 1x1 501 F	4	274	535 [4]	6830	0.5 [5]	neg. [6]	2.82	gas	19.25	2.2 [7]	2.7 [7]	0.5	30	0.1149	97.58	39.44	32.97
35	Westinghouse 1x1 501 G	1	365 [8]	524	6530 [8]	0.2 [5]	neg. [6]	2.82	gas	18.41	10.9	1.5	0.2	30	0.1149	103.49	38.61	31.40
36	GE "H" 1x1	1	400 [8]	510	6320 [8]	0.2 [5]	neg. [6]	2.82	gas	17.81	10.8	1.4	0.2	30	0.1149	100.61	37.45	30.41
	Combined Cycle - Oil Fired																	
37	GE 7EA 1x1	4	134	660 [4]	7210	1.8 [5]	0.4 [6]	5.06	oil	36.50	3.4 [7]	2.6 [7]	1.9	30	0.1149	133.55	61.19	53.15
38	GE 7EA 2x1	4	273	563 [4]	7100	1.8 [5]	0.4 [6]	5.06	oil	35.85	2.3 [7]	2.4 [7]	1.8	30	0.1149	118.83	57.57	50.76
39	Westinghouse 1x1 501 F	4	283	535 [4]	6520	0.9 [5]	0.4 [6]	5.06	oil	33.01	2.2 [7]	2.8 [7]	0.9	30	0.1149	111.37	53.22	46.76
40	Westinghouse 1x1 501 G	1	377 [8]	524	6230 [8]	0.2 [5]	0.4 [6]	5.06	oil	31.54	10.9	1.5	0.2	30	0.1149	116.25	51.38	44.17
41	GE "H" 1x1	1	413 [8]	510	6030 [8]	0.2 [5]	0.3 [6]	5.06	oil	30.53	10.8	1.4	0.2	30	0.1149	113.16	49.80	42.78
	Combustion Turbine - Gas Fired																	
42	GE LM6000	5	44 [8]	519	9030 [8]	0.9 [5]	neg. [6]	2.82	gas	25.45	5.7	7.2	0.8	30	0.1149	111.36	51.71	45.08
43	GE 7EA	5	85 [8]	376	11570 [8]	1.1 [5]	neg. [6]	2.82	gas	32.61	3.5	24.6	1.1	30	0.1149	115.70	73.06	66.32
44	GE 7FA	5	172 [8]	256	10460 [8]	0.3 [5]	neg. [6]	2.82	gas	29.48	2.6	10.8	0.3	30	0.1149	85.00	52.45	46.83
45	Westinghouse 501 G	5	253 [8]	326	10260 [8]	0.8 [5]	neg. [6]	2.82	gas	28.92	2.2	12.1	0.8	30	0.1149	90.89	54.51	50.49
	Combustion Turbine - Oil Fired																	
46	GE LM6000	5	44 [8]	519	8740 [8]	1.8 [5]	0.4 [6]	5.06	oil	44.25	5.7	7.6	1.6	30	0.1149	130.60	70.95	64.32
47	GE 7EA	5	89 [8]	376	11600 [8]	2.7 [5]	0.6 [6]	5.06	oil	58.73	3.5	25.6	2.8	30	0.1149	144.09	101.45	98.71
48	GE 7FA	5	181 [8]	256	10490 [8]	1.3 [5]	0.5 [6]	5.06	oil	53.11	2.6	11.4	1.3	30	0.1149	109.62	77.06	73.46
49	Westinghouse 501 G	5	266 [8]	326	10290 [8]	1.3 [5]	0.5 [6]	5.06	oil	52.10	2.2	12.7	1.3	30	0.1149	114.43	78.25	74.23

Sources:

1. Market-Based Advanced Coal Power Systems - May 1999 (Dept. of Energy). Costs provided in 1998 dollars adjusted to 2000 dollars at rate of historical CPI.
2. Georgia Power Company 1998 Integrated Resource Plan. Costs provided in 1997 dollars adjusted to 2000 dollars at rate of historical CPI.
3. 1998 Florida Power & Light Company Form 1. Costs provided in 1998 dollars adjusted to 2000 dollars at rate of historical CPI.
4. Gas Turbine World Handbook 2000. Capacity and heat rate at ISO conditions for gas-fired operation. Heat Rate provided as LHV adjusted to HHV by factor of 1.11 for gas and 1.06 for oil. Capacity for oil operation adjusted by factor of 1.05.
5. Kissimmee Utility Authority/Florida Municipal Power Agency Need For Power Application-Cane Island Power Park Unit 3 at rate of historical CPI.
6. Renewable Energy Technology Characterizations (EPRI Topical Report No. TR-109496, December 1997). Costs provided in 1997 dollars adjusted to 2000 dollars at rate of historical CPI.

Notes:

[1] Installed cost provided in 1961 dollars adjusted to 1998 dollars by Handy Whitman index and further adjusted to 2000 dollars by historic CPI.
[2] NOx and SO2 emissions provided in year 2000 Title V air permit for FP&L Martin plant.
[3] Represents total O&M costs (fixed and variable).
[4] Installed cost provided in 1999 dollars adjusted to 2000 dollars and adjusted by factor of 1.25 to include indirect costs.
[5] NOx emissions provided in year 2000 Title V air permit from Florida in ppm adjusted to lb/MWh. Does not include SCR equipment.
[6] SO2 emissions calculated assumming .25 grains/SCF of gas and 0.05% Sulfur oil with heat contenet of 18,500. Does not include SCR equipment.
[7] Fixed and variable O&M provided from Source No. 5.
[8] Capacity and heat rate provided from Source No. 4.
[9] Excludes A&G costs and property taxes

FRCC
Committed Generating Resources

No.	(a) Utility	(b) Plant Name	(c) Committed Resources[13]	(d) In-Service Year	(e) Seasonal Rating Summer (MW)	(f) Seasonal Rating Winter (MW)	(g) Primary Fuel	(h) Secondary Fuel	(i) Full Load Heat Rate (HHV Btu/kWh)	(j) Equivalent Availability Factor (%)	(k) Total Installed Cost[1] ($/kW)	(l) Direct Construction Cost[1] ($/kW)	(m) Technology Type
1	Panda	Leesburg	✓	2003	1,100	1,150	Gas	--	6,900 [2]	95%	--	335 [3]	Combined Cycle
2	Panda	Midway	✓	2003	1,100	1,150	Gas	--	6,900 [2]	95%	--	336 [3]	Combined Cycle
3	Const.	Oleander	✓	2002	950	950	Gas	--	10,767	97%	--	235	Combustion Turbine
4	PG&E	Okeechobee	✓	2003	514 [4]	561 [4]	Gas	FO2	6,775 [4]	93%	--	352 [4]	Combined Cycle
5	Duke	New Smyrna Beach	✓	2002	476 [5]	548 [5]	Gas	--	6,832 [5]	96%	--	323 [5]	Combined Cycle
6	FPL	Ft. Myers Repowering	✓	2002	926 [6]	1,102 [6]	Gas	--	6,830 [6]	96%	557 [9]	503 [6]	Combined Cycle/Repower
7	FPL	Sanford Repowering	✓	2003	1,132 [6]	1,342 [6]	Gas	--	6,860 [6]	96%	716 [9]	591 [6]	Combined Cycle/Repower
8	TALL	Purdom 8	✓	2000	233	262	Gas	FO2	6,940	--	483	434	Combined Cycle
9	FPC	Hines 1	✓	1999	470 [7]	505 [7]	Gas	FO2	6,962 [7]	91%	600 [7]	--	Combined Cycle
10	FPC	Intercession City 12-14	✓	2000	240 [8]	282 [8]	Gas	FO2	13,272 [8]	91%	--	--	Combined Cycle
11	TPS	Hardee	✓	2001	75	75	Gas	--	--	--	--	--	Combustion Turbine
12	GRU	J.R. Kelly 4&8	✓	2001	60 [9]	60 [9]	Gas	FO2	7,880	84%	588 [10]	--	Combined Cycle/Repower
13	SEC	Hardee 3	✓	2002	488	572	Gas	FO2	6,849 [11]	93%	412	378	Combined Cycle
14	TECO	Polk 2	✓	2000	155 [12]	180 [12]	Gas	FO2	10,580 [12]	94%	--	--	Combustion Turbine
15	TECO	Polk 3	✓	2002	155 [12]	180 [12]	Gas	FO2	10,580 [12]	94%	--	--	Combustion Turbine
16	FMPA	Cane Island 3	✓	2001	244	264	Gas	FO2	6,815	92%	449	320	Combined Cycle
17	LAK	McIntosh 5	✓	2002	337	384	Gas	FO2	6,523	91%	671	671	Combined Cycle
18	JEA	Northside 1-2	✓	2002	265	265	PC	Coal	9,946	90%	--	658	CFB Steam/Repower
19	JEA	Kennedy CT 7	✓	2000	149	186	Gas	FO2	11,120	97%	--	261	Combustion Turbine
20	JEA	Brandy Branch CT 1	✓	2001	149	186	Gas	FO2	11,120	97%	--	264	Combustion Turbine

[1] In-service year dollars per kilowatt.
[2] New and clean, most efficient conditions
[3] Shown in year 2001 dollars per kilowatt.
[4] PG&E Okeechobee based on information from Okeechobee Generating Co. 2000 TYSP.
[5] Duke/New Smyrna Beach based on information from Duke Energy New Smyrna Beach 2000 TYSP. Based on direct construction cost divided by annual average capacity.
[6] FPL Ft Myers and Sanford Repowering Projects information from FPL 2000 TYSP.
[7] Cost data for Hines # 1 based on projected capital investment of $300,000,000 and nominal capacity rating of 500 MW, as shown in FPC's 1996 TYSP.
[8] Intercession City Plant information from FPC 2000 TYSP.
[9] Incremental capacity addition
[10] Dollar per kW cost for repowering projects computed based on project costs divided by incremental capacity addition.
(11) Heat rates reported in utility TYSP's that were adjusted upward by an assumed 11% to account for conversion from low heating value (LHV) to high heating value (HHV).
(12) Polk units 2 & 3 information from TECO 2000 TYSP.
(13) Committed resources reflect those resources that have received construction or air permitting, or have submitted certificate of need applications prior to Panda's Midway and Leesburg resources.

Sources:
Panda Midway Power Partners, L.L.C., and Panda Leesburg Power Partners, L.L.C.
1999 Ten Year Site Plan Filings (TYSP), Schedule 9.
2000 Ten Year Sight Plan Filings , Schedule 9, where noted.
Okeechobee Generating Company, L.L.C.
Duke Energy Power Services, L.L.C
Oleander Power Project, L. P. 2000 TYSP