

080253

Florida Electrical Power Plant Siting Act Need for Power Application

Cane Island Power Park – Unit 4



Submitted by:
Florida Municipal Power Agency

May 2008



Florida Municipal Power Agency
Community Power. Statewide Strength.

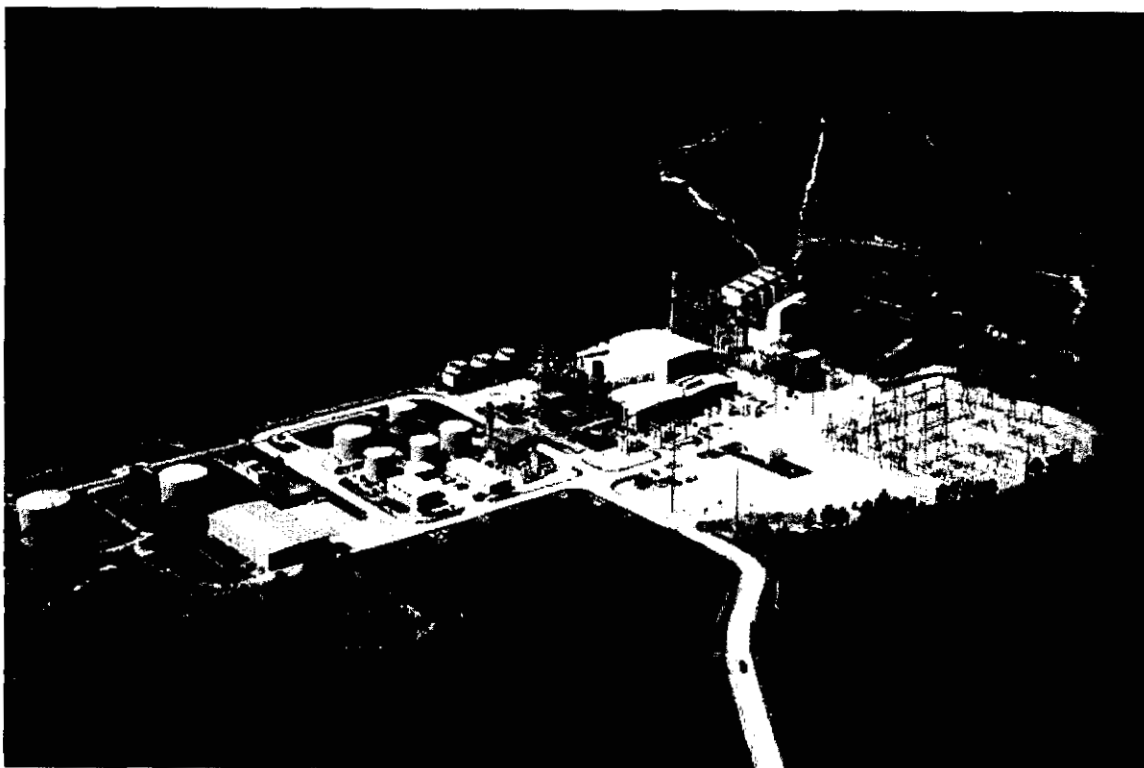
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FPSC - COMMISSION CLERK

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF

ROGER A. FONTES

ON BEHALF OF

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. _____

MAY 7, 2008

Q. Please state your name and business address.

A. My name is Roger A. Fontes. My business address is 8553 Commodity Circle, Orlando, Florida 32819.

Q. What is your current position?

A. I am General Manager and Chief Executive Officer of Florida Municipal Power Agency, which is commonly referred to as FMPA.

Q. Please briefly describe your professional background.

A. I have over 37 years of experience in the utility industry. Prior to joining FMPA in 2001, I was the Assistant General Manager at the Northern California Power Agency (NCPA). I spent 20 years with NCPA, including executive positions as System Planning and Development Manager and Legislative and Regulatory Manager. During this period I was appointed by California's Governor and the U.S. Secretary of the Interior to serve on the Bay-Delta Advisory Council representing the state's hydroelectric power industry. Prior to joining NCPA, I was

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1 employed for five years by the California Energy Commission as Chief Energy
2 Engineer and Energy Supply Assessment Manager. Prior to that, I was with the
3 City of Los Angeles Department of Water and Power from 1971 to 1976.

4

5 **Q. What is the purpose of your testimony?**

6 A. The purpose of my testimony is to provide an overview of FMPA and its All-
7 Requirements Power Supply Project (ARP) relative to the need for Cane Island 4. I
8 also will discuss FMPA's ability to finance the construction of Cane Island 4.

9

10 **Q. Are you sponsoring any Sections of the Need For Power Application that has
11 been marked as Exhibit No. ___ [FMPA-1]?**

12 A. Yes. I am sponsoring Section 22.0 of the Application, which was prepared under
13 my direct supervision.

14

15 **Q. Are you sponsoring any exhibits?**

16 A. Yes. I am sponsoring Exhibit No. ___ [RAF-1], entitled "ARP Member Cities."

17

18 **Q. Please describe FMPA.**

19 A. FMPA is a nonprofit, public, joint action agency consisting of 30 municipal electric
20 utilities with the primary purpose of developing competitive power supply and
21 related services. FMPA's mission is to develop economical and competitive power
22 supply projects, to be proactive in providing member services, and to promote the
23 image of public power, enabling its member utilities to succeed in a rapidly
24 changing environment. Each member appoints one representative to FMPA's

1 Board of Directors, which governs the Agency's activities. Each member utility is
2 locally owned and operated; however, municipal utilities share common concerns
3 that can best be solved by working together. This helps reduce the cost of power
4 through economies of scale. Through FMPA, municipals have been successful in
5 reducing power costs, diversifying power supply resources, and providing a
6 measure of competition in the wholesale market.

7
8 **Q. Please provide an overview of the All-Requirements Power Supply Project.**

9 A. FMPA is specifically authorized under the Joint Power Act to undertake joint
10 projects for its members and to issue tax-exempt bonds and other obligations to
11 finance the costs of such projects. Pursuant to that authority, FMPA developed the
12 ARP to secure an adequate, economical and reliable supply of electric capacity and
13 energy to meet the needs of the ARP members, which are comprised of fifteen
14 municipal utilities serving approximately 180,000 customers throughout Florida.
15 ARP members purchase all their capacity and energy from the ARP. FMPA serves
16 the needs of the ARP using FMPA owned or co-owned facilities, as well as power
17 purchases from generating ARP members (i.e., members with their own generating
18 capacity and purchases) and other, utilities or independent power products (IPPS).

19
20 **Q. Who are the fifteen members of the ARP?**

21 A. The fifteen ARP member utilities currently include the Kissimmee Utility
22 Authority, Fort Pierce Utilities Authority, Keys Energy Services (Key West),
23 Beaches Energy Services (Jacksonville Beach), and the Cities of Bushnell,
24 Clewiston, Fort Mead, Green Cove Springs, Havana, Lake Worth, Leesburg,

1 Newberry, Ocala, Starke and Vero Beach. With members extending from Havana
2 to Key West, the ARP member cities are geographically diverse, as shown in
3 Exhibit No. __ [RAF-1].
4

5 **Q. Please describe how the Membership governs the ARP.**

6 A. The ARP is governed by an Executive Committee. The Executive Committee is
7 comprised of one representative from each of the 15 ARP members.
8

9 **Q. What steps has FMPA taken to lower cost and improve reliability for the
10 ARP?**

11 A. Historically FMPA's options were limited to being a joint participant in generating
12 units to obtain fuel diversity and economies of scale. Examples of these projects
13 include the St. Lucie 2 nuclear unit, the Stanton 1 and 2 coal fueled units, and the
14 Stanton A and Cane Island 2 and 3 combined cycle units. In addition, FMPA relied
15 on purchase power agreements. Many of the ARP member owned generating units
16 are old and inefficient. Recently FMPA has been developing new larger and more
17 efficient combined cycle units in order to meet ARP load growth and to allow
18 retirement of the old inefficient member generation. One example of this is the
19 Treasure Coast Energy Center in Fort Pierce which is scheduled to enter
20 commercial operation in May 2008. Another example is this proposed Cane Island
21 Unit 4. These efficient combined cycle units have allowed FMPA to reduce
22 generating costs with natural gas by significantly lowering the system heat rate.
23 This retooling and modernization of the ARP system has the additional benefit of
24 reducing emissions, including emissions of CO₂. Without these new combined

1 cycle units including Cane Island 4, it would be very difficult for FMPA to reduce
2 emissions cost effectively.

3
4 FMPA has also been active in the areas of renewables and DSM. FMPA went to
5 the market through several requests for proposals (RFP) which will be discussed in
6 detail by our other witnesses. We continue to negotiate in earnest with a number of
7 the bidders. Since our member cities are surrounded by the investor-owned utilities
8 service areas, it is extremely important that our rates remain competitive. Thus the
9 cost of renewables and their overall impact on our rates is important. One of the
10 bright spots from our RFP process is the identification of a 10 MW initial solar
11 photovoltaic project with potential to ultimately increase the photovoltaic capacity
12 to 100 MW. Our Executive Committee is currently scheduled to address approval
13 of the contract for the initial 10 MW at their May 22, 2008 meeting. While the
14 costs are significantly above our avoided costs, many of our members feel it is
15 important to move forward with solar. I am optimistic about the projects' ultimate
16 implementation. FMPA's potential 10 MW solar project is significant,
17 particularly considering the size of FMPA's system. By comparison, Florida
18 Power & Light Company (FPL), which has a much larger system, recently
19 announced an equally sized (10 MW) initial commitment to solar with a potential
20 ultimate commitment of 300 MW.

21
22 With respect to DSM, FMPA is negotiating with bidders from the RFP process and
23 I am hopeful that an agreement will be reached that will enable FMPA to cost
24 effectively reduce our peak demand.

1 In the longer term, FMPA is actively pursuing nuclear capacity for economic and
2 environmental benefits. FMPA has been in active discussions regarding
3 participation in Progress Energy Florida's Levy County Units 1 and 2. FMPA is
4 also looking forward to discussions with FPL for potential participation in Turkey
5 Point Units 6 and 7.

6

7 **Q. How does FMPA intend to finance the construction of Cane Island 4?**

8 A. FMPA has several funding sources available that may be used to finance the
9 development and construction of Cane Island 4. These sources include internal
10 funds, pooled loans, and new long-term debt issuances.

11

12 **Q. Please explain how these financing sources may be used by FMPA.**

13 A. FMPA would typically use a combination of pooled loans and long term debt.

14

15 As the initial development concludes and construction commences, FMPA may
16 rely on its pooled loan commercial paper to get the construction process underway.
17 The pooled loan is an ongoing FMPA project which provides FMPA and its
18 members' loans at very competitive rates which are ultimately financed with tax
19 exempt commercial paper. The pooled loans could be expected to be used for
20 financing up to the first \$100 million of costs.

21

22 Once the project is well defined and construction underway, FMPA could and
23 would ultimately initiate a revenue bond issuance for long-term project funding.

24

1 **Q. Is FMPA confident in its ability to secure revenue bonds to finance Cane**
2 **Island 4?**

3 A. Yes. Based on the project's favorable economics and FMPA's excellent credit
4 rating, we believe there will be no problems issuing debt to cover the project cost.
5 FMPA has recently initiated bond offerings with tax-exempt interest rates
6 consistent with or below the rates assumed for the economic analyses of Cane
7 Island 4.

8

9 **Q. What are FMPA's current credit ratings?**

10 A. FMPA has a credit rating of A+ from Fitch and an A1 from Moody's Investors
11 Service. Typically, FMPA purchases bond insurance on its long-term bonds to
12 increase its ratings to AAA and Aaa, respectively.

13

14 **Q Please summarize FMPA's need for Cane Island 4.**

15 A. As discussed in detail in the Need for Power Application and testimony of other
16 witnesses, Cane Island 4 is needed by FMPA to maintain the ARP's system
17 reliability by providing capacity to meet load growth and to enable potential
18 retirement of old inefficient units. Cane Island 4 is FMPA's lowest cost alternative
19 and provides significant environmental benefits to FMPA's system. While
20 renewables, DSM, and conservation are and are projected to be important parts of
21 the ARP system, there are no reasonably available renewable, DSM, or
22 conservation alternatives which would supplant the need for Cane Island 4.

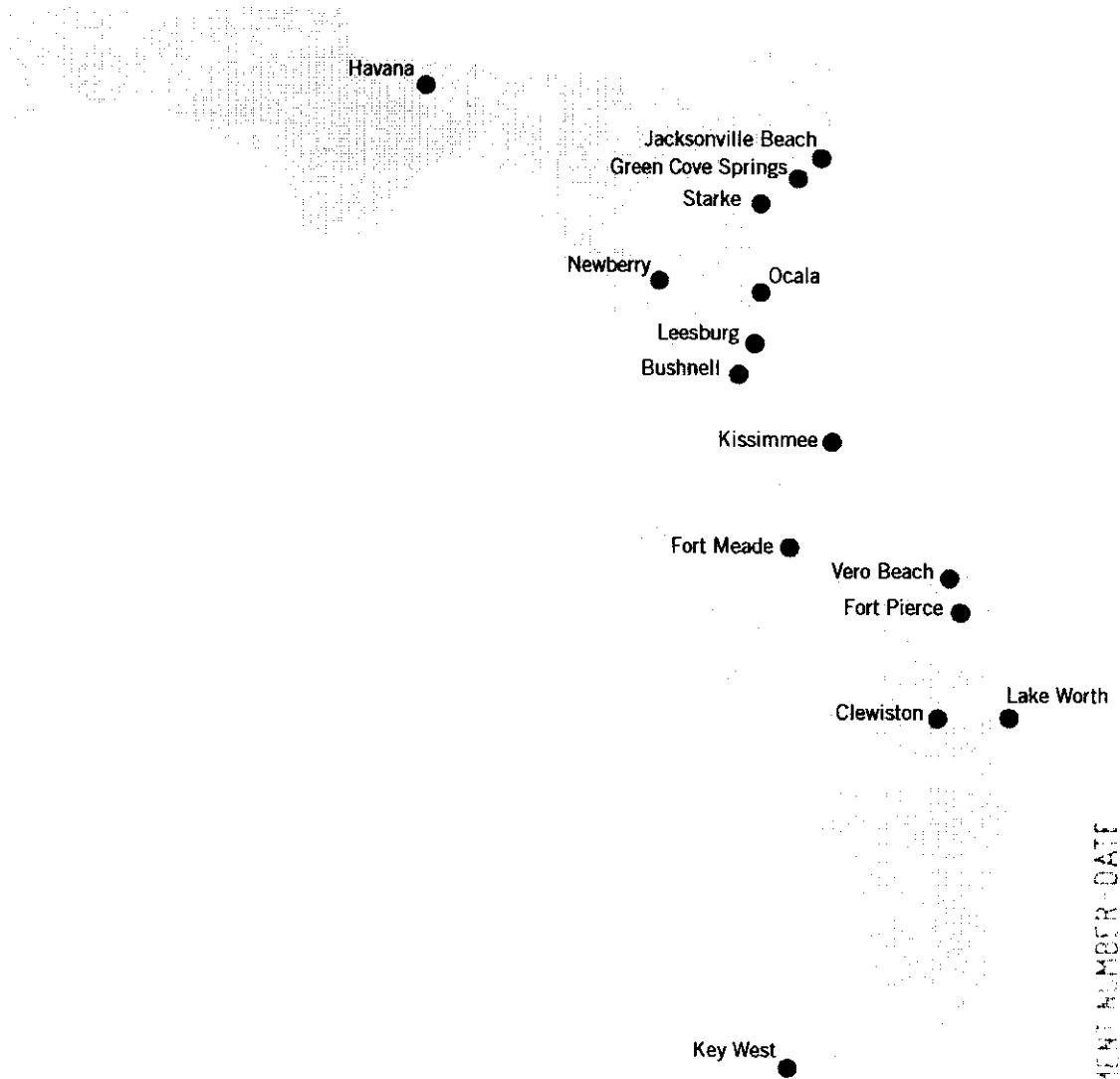
23

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

2 A. Yes.

ARP Members

The figure below shows ARP Member city locations.



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1 BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

2 DIRECT TESTIMONY OF THOMAS E. REEDY

3 ON BEHALF OF

4 FLORIDA MUNICIPAL POWER AGENCY

5 DOCKET NO. _____

6 MAY 7, 2008

7
8 **Q. Please state your name and business address.**

9 A. My name is Thomas E. Reedy. My business address is 8553 Commodity Circle,
10 Orlando, Florida 32819.

11
12 **Q. By whom are you employed and in what capacity?**

13 A. I am employed by Florida Municipal Power Agency (FMPA) as the Assistant
14 General Manager of the Power Resources Division.

15
16 **Q. Please describe your responsibilities in that position.**

17 A. As the Assistant General Manager of the Power Resources Division for FMPA, I
18 have responsibility for managing power supply and transmission planning,
19 project development, power supply contracts, regulatory affairs, operations and
20 fuels.

21
22 **Q. Please state your educational background and professional experience.**

23 A. I received a Bachelor of Science degree in Electrical Engineering, with a focus
24 on Electrical Energy Engineering, from the University of Florida, Gainesville,

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1 Florida. I am a registered professional engineer in the state of Florida. My 30
2 years in the electric utility industry have encompassed many facets of the
3 business, including experience in cogeneration development, electric utility
4 planning, electric utility dispatching and operations, forecasting and load
5 research. Before joining FMPA, I served four years as an executive consultant
6 for Resource Management International, Inc (now Navigant Consulting).

7

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

9 **A.** The purpose of my testimony is to:

- 10 • explain how FMPA serves the needs of the All-Requirements Power
11 Supply Project (ARP);
- 12 • discuss FMPA's participation the Florida Municipal Power Pool (FMPP)
- 13 • summarize FMPA's existing generation system and existing purchase
14 power resources as well as FMPA's transmission system;
- 15 • provide an overview of the supply of natural gas and availability of
16 natural gas transportation for Cane Island 4;
- 17 • discuss transmission system impacts associated with the addition of Cane
18 Island 4.
- 19 • summarize FMPA's historical and planned conservation and DSM
20 programs; and
- 21 • discuss the solar photovoltaic (PV) resources that FMPA is considering as
22 a result of a request for proposals process.

23

1 **Q. Are you sponsoring any exhibits as part of your testimony?**

2 A. Yes. I am sponsoring Exhibit No. __ [TER-1], entitled "ARP's Existing
3 Resource Capacity," and Exhibit No. __ [TER-2], which is a copy of my resume.

4

5 **Q. Are you sponsoring any sections of Exhibit No. __ [FMPA-1], the Cane
6 Island Unit 4 Need for Power Application?**

7 A. Yes. I am sponsoring Sections 3.0, 6.0, 8.0, 11.0, 16.3, 17.0 (except for 17.2),
8 and Appendix C, all of which were prepared under my direct supervision.

9

10 **Q. Why is FMPA submitting a Need for Power Application?**

11 A. FMPA is projected to require additional capacity by 2011 to continue to reliably
12 serve the needs of ARP members.

13

14 **Q. How does FMPA serve the ARP members' electricity needs.?**

15 A. ARP members are required to purchase all of their capacity and energy from the
16 ARP with the exception of excluded resources that are the ARP members'
17 ownership shares of nuclear generating units (Crystal River 3 and St. Lucie 2).
18 ARP members that own generation must make that capacity available for use by
19 the ARP. The ARP supplies all the member requirements with FMPA owned
20 resources, jointly owned resources, purchased power, and member owned
21 resources. ARP member contracts for purchase and sale have an initial term of
22 30 years and are then automatically extended on a year-for-year basis.

23

1 **Q. Please describe the Florida Municipal Power Pool.**

2 A. The FMPP was formed in 1988 and is a power pool comprised of three members
3 including the Orlando Utilities Commission (OUC), Lakeland Electric, and
4 FMPPA. The FMPP's member generating resources are centrally dispatched to
5 meet the combined energy requirements of the FMPP members.

6

7 FMPP resources include the members' generating units as well as purchased
8 power. Each FMPP member is responsible for maintaining sufficient capacity to
9 serve its own load, including an adequate reserve margin. The resources are
10 committed and dispatched by OUC, which handles the day-to-day operations of
11 the FMPP.

12

13 **Q. Please describe FMPPA's current spinning and operating reserve**
14 **requirements.**

15 A. The Florida Reliability Coordinating Council (FRCC) operating reserve is
16 maintained by the combined systems in Florida at a value equal to, or greater
17 than, the summer gross FRCC capability rating of the largest generating unit in
18 service in FRCC. Currently, the operating reserve requirement of the FMPP is
19 99 MW, which includes 25 MW of spinning reserves. FMPPA's share of
20 FMPP's operating reserves is 31.6 MW, which includes 7.9 MW of spinning
21 reserves.

22

1 **Q. Please describe FMPA's current transmission system.**

2 A. Florida's electric grid is tied to the rest of the continental United States at the
3 Florida/Georgia/Alabama interface. Florida Power & Light Company (FPL),
4 Progress Energy Florida (PEF), JEA, and the City of Tallahassee own the
5 transmission tie lines at the Florida/Georgia interface. ARP members'
6 transmission lines are interconnected with transmission facilities owned by FPL,
7 PEF, OUC, JEA, Seminole Electric Cooperative, Florida Keys Electric
8 Cooperative Association, and Tampa Electric Company (TECO). The Florida
9 electric transmission grid is interconnected by high voltage transmission lines
10 ranging from 69 kV to 500 kV.

11

12 **Q. Does the ARP utilize purchase power contracts as part of their power
13 supply portfolio?**

14 A. Yes. The ARP may purchase power from other entities to contribute to its
15 power supply resources. Additionally, purchase power contracts that individual
16 member cities had in place prior to joining the ARP are utilized to serve the
17 ARP's electricity needs. Existing purchase power contracts include purchases
18 from PEF, FPL, Calpine, and Southern Power Company.

19

20 **Q. Did FMPA consider either extending existing purchase power contracts or
21 entering into new purchase power contracts in lieu of the construction of
22 Cane Island 4?**

23 A. Yes. FMPA held discussions with PEF, FPL, and Calpine regarding extension
24 of existing purchase power contracts that will expire in the near future. These

1 discussions did not result in any contract extensions. The Southern Power
2 Company contract already contains contract extension provisions and for
3 evaluation purposes, it was assumed to extend through the evaluation period.

4
5 As discussed in the prefiled testimony of Mr. Nicholas Guarriello, FMPA
6 conducted a request for proposals (RFP) process to solicit power supply offers
7 from other entities. No responses to the power supply RFP were submitted to
8 FMPA.

9
10 **Q. Please summarize the capacity resources currently available to the ARP.**

11 A. The ARP's existing capacity resources (summer rating) are presented in Exhibit
12 No. __ [TER-1]. Exhibit No. __ [TER-1] illustrates that ARP's capacity
13 resources decrease as many of ARP's purchase power contracts will expire in
14 the near-term and older, less efficient generating units are retired.

15
16 **Q. Which units will be retired and how will their retirement affect FMPA's
17 generating capacity?**

18 A. FMPA plans for certain member-owned generating units to be retired because of
19 their age and inefficiency. However, ARP members control the retirement of
20 their generating units. The units planned by FMPA to be retired during the
21 period considered in this Application include units owned by Fort Pierce
22 Utilities Authority, Lake Worth, and Kissimmee Utility Authority. The total
23 reduction in summer capacity due to these unit retirements is 250 MW.

24

1 - **Q. Are there concerns regarding the availability of natural gas?**

2 - A. No. Based on information provided in the Energy Information
3 Administration's Annual Energy Outlook 2007 (AEO2007), FMPA believes that
4 there will be adequate supply of natural gas. The incremental addition of natural
5 gas recovered from available leasing and development areas along with natural
6 gas from new leasing and development areas, would serve as a potential natural
7 gas resource for the Cane Island 4. Based on the pricing forecast established for
8 transporting natural gas into the Florida Reliability Coordinating Council region,
9 the sources of natural gas located in the lower 48 Outer Continental Shelf and
10 new onshore production provide reasonable assurance of the adequate
11 availability of natural gas for Cane Island 4.

12
13 - **Q. How will liquefied natural gas (LNG) contribute to the availability of
14 natural gas for Cane Island 4?**

15 A. With US natural gas production remaining relatively constant, imports of natural
16 gas are projected to increase to meet the growing power generation demand of
17 domestic consumption. Most of the expected growth in US natural gas imports
18 is expected to be in the form of LNG. The expansion of LNG supplies after
19 2012 will increase the probability for Cane Island 4 to receive natural gas from
20 LNG terminals located in the southeastern United States.

21 -

1 - **Q. How have recent proven natural gas reserves compared to historical**
2 **levels?**

3 - A. As of December 31, 2006, proven natural gas reserved were at the
4 highest level since 1976. Proven reserves of natural gas increased by 3 percent
5 from 2005 to 2006.

6 -

7 **Q. Please discuss natural gas pipeline and storage infrastructure as it relates**
8 **specifically to Florida.**

9 A. The southeastern portion of the United States accounts for approximately 38,127
10 total miles of pipelines, with the State of Florida accounting for 4,746 miles of
11 pipeline. The total Florida pipeline capacity is served by four companies:
12 Florida Gas Transmission (FGT), GulfSouth Pipeline, Gulfstream Natural Gas
13 System, LLC (Gulfstream), and Southern Natural Gas. In addition, natural gas
14 storage facilities are being developed along the Gulf Coast in numerous
15 locations in close proximity for serving the State of Florida. Current gas
16 transportation capacity serving the State of Florida on these four pipelines is
17 fully subscribed. The additional demand caused by future power generation
18 projects like Cane Island 4 in Florida will require pipeline capacity expansions.
19 FGT has already announced a significant expansion of its facilities and other
20 expansions are currently being evaluated. These four pipelines current and
21 proposed transportation capacity, along with the existing and proposed storage
22 facilities, will provide adequate natural gas transportation and storage capacity
23 for the Florida market.

24

1 **Q. Please describe the natural gas storage facilities that will serve the Florida**
2 **market.**

3 A. There are a number of natural gas storage facilities under development and in
4 operation that will serve the Florida market. The Floridian Natural Gas Storage
5 Company LLC (FGS) facility is proposed and will be located in an industrial
6 area near Indiantown in Martin County, Florida. The FGS facility will consist
7 of two aboveground LNG storage tanks, each capable of storing up to 4 billion
8 cubic feet (Bcf) of natural gas; refrigeration compressors to cool the gas; and re-
9 gasification equipment. Natural gas will be delivered to and from FGS using
10 both the FGT and Gulfstream natural gas pipeline systems. FGS is expected to
11 begin commercial operation in mid-2011 as currently proposed.

12
13 Southern Pines Energy Center is being developed as a FERC-regulated natural
14 gas storage facility in Greene County, Mississippi. The project site has the
15 capability to develop up to five 8 Bcf caverns for a total working gas capacity of
16 40 Bcf. The first cavern entered commercial operation on May 1, 2008 with a
17 second cavern planned for commercial operation later this year. A third cavern
18 is currently scheduled for commercial operation in 2010. FMPA will have 1 Bcf
19 of capacity in this facility by the time Cane Island 4 is constructed. This storage
20 will provide significant capabilities for daily operations and provide supply
21 source reliability during gas supply production interruptions.

22
23 MoBay Storage Hub LLC will provide high-deliverability, multicycle (HDMC)
24 gas storage services to the Southeast market. MoBay is located in Mobile

1 County, Alabama and will initially connect with four major interstate pipelines
2 systems serving the Southeast and Northeast markets. Currently, the combined
3 pipeline takeaway capacity at MoBay is 6.9 Bcf per day to the east and 3.9 Bcf
4 per day to the west. MoBay would be the most southeasterly HDMC storage
5 facility in the United States and the only storage facility directly connected to
6 the Gulfstream Natural Gas System. The proposed MoBay compressor station
7 will be located directly adjacent to Gulfstream Station 410 in Mobile County,
8 Alabama. Working gas capacity will be 50 Bcf, with maximum injection and
9 withdrawal capability of 1 Bcf per day.

10

11 Bay Gas Storage operates two high-deliverability, natural gas, salt dome storage
12 caverns located in the northeastern corner of Mobile County, Alabama with a
13 combined total working gas capacity of 6.0 Bcf. Total injection capacity at the
14 facility is 200 million cubic feet (MMcf) per day, and withdrawal capacity is
15 610 MMcf per day. A third storage cavern is currently under development and
16 is expected to be operational by spring 2008; this cavern will add approximately
17 5.0 Bcf of working gas capacity. Injection capacity at this cavern will be 250
18 MMcf per day, and withdrawal capacity will be 600 MMcf per day. Total
19 working gas capacity will increase from 6.0 Bcf to 11.0 Bcf upon completion of
20 the third cavern.

21 **Q. Are there other proposed projects that will benefit the Florida natural gas**
22 **market?**

23 A. Yes. The Southeast Supply Header, LLC (SESH) is a joint venture between
24 subsidiaries of CenterPoint Energy, Inc. and Spectra Energy. The 270 mile,

1 36 inch and 42 inch diameter pipeline will have an estimated capacity of 1 Bcf
2 per day. The pipeline will extend from the Perryville Hub in northeastern
3 Louisiana to Gulfstream in southern Mobile County, Alabama, and will have
4 two interconnects with FGT, yielding a capacity of over 1 Bcf per day into each
5 pipeline.

6
7 **Q. Will the addition of Cane Island 4 require FMPA to construct any new**
8 **natural gas pipelines?**

9 A. No. The Cane Island site is currently served by two separate existing natural gas
10 pipelines – one owned by FGT and one owned by Gulfstream Natural Gas
11 System, LLC (Gulfstream).

12
13 **Q. Please describe Gulfstream.**

14 A. The Gulfstream system consists of a 691 mile pipeline that was placed in service
15 in May 2002. Gulfstream can serve customers on both the east and west coasts
16 of Florida, as well as the interior of the peninsula. The Gulfstream system went
17 into service with an initial capacity of 1.1 Bcf per day of gas.

18
19 **Q. Does FMPA anticipate that Gulfstream will have adequate natural gas**
20 **delivery capacity to reliably serve Cane Island 4?**

21 A. Yes. Gulfstream has undertaken several system extensions/expansions since its
22 initial in-service date of May 2002. Most recently, Gulfstream conducted an
23 Open Season from June 1 to August 31, 2007, to gauge market interest in an
24 expansion of its existing natural gas pipeline system. The expansion was

1 designed for up to 750,000 MBtu per day of incremental firm transportation
2 service. Since then, Gulfstream has reduced their proposed expansion by
3 approximately 50 percent of the initial design, with a proposed expansion
4 capacity of between 350,000 and 450,000 MBtu per day.

5

6 **Q. What is the planned in-service date for the proposed Gulfstream**
7 **expansion?**

8 A. The new service from the mainline expansion is anticipated to be available in
9 late 2011 to 2012. Gulfstream has indicated that they would be able to supply
10 30,000 to 45,000 MBtu per day of firm capacity for Cane Island 4 prior to the
11 in-service date of the mainline expansion if such provision was necessary for
12 Cane Island 4.

13

14 **Q. Has FMPA explored the potential acquisition of firm natural gas**
15 **transportation from the proposed Gulfstream expansion?**

16 A. During the Open Season period, FMPA submitted a request for a volume of
17 20,000 MBtu per day of firm capacity to serve Cane Island 4. This submittal
18 was a non-binding request for capacity. Subsequent discussions are ongoing to
19 define the specific details of an arrangement which could lead to a binding
20 Precedent Agreement between FMPA and Gulfstream for incremental capacity
21 of up to approximately 45,000 MBtu per day.

22

1 **Q. Please describe FGT.**

2 A. FGT operates a 5,000 mile natural gas pipeline system that extends from south
3 Texas to south Florida with a current mainline capacity of 2.1 Bcf per day.
4 FGT's total receipt point capacity is in excess of 3.0 Bcf per day and includes
5 interconnections with 10 interstate and 10 intrastate pipelines to facilitate
6 receiving supplies of natural gas into its pipeline system. The pipeline has
7 extensive access to diverse natural gas supplies, including the offshore Gulf of
8 Mexico region.

9
10 **Q. Does FMPA anticipate that FGT will have adequate natural gas delivery
11 capacity to reliably serve Cane Island 4?**

12 A. Yes. FGT has continuously added pipeline capacity to increase its ability to
13 offer firm natural gas transportation service into the state of Florida and meet the
14 growing demand for natural gas within the State. Most recently, FGT conducted
15 an Open Season ending on February 15, 2008, for a proposed Phase VIII
16 expansion project. The Phase VIII expansion is expected to provide an
17 additional 0.8 Bcf per day, and bring the total capacity of FGT to 2.9 Bcf per
18 day when completed. On February 11, 2008, FGT announced that Florida
19 Power & Light Company (FPL) had agreed to become the anchor shipper of the
20 proposed natural gas pipeline expansion project through a 25 year service
21 agreement for 400 MMcf per day of capacity.

22

1 **Q. Has FMPA explored the potential acquisition of firm natural gas**
2 **transportation from FGT's proposed Phase VIII expansion?**

3 A. During the Phase VIII Open Season period, FMPA submitted a request for firm
4 capacity of 30,000 MBtu per day to serve Cane Island 4. This submittal was a
5 nonbinding request for capacity. Subsequent discussions have occurred where
6 FGT required a binding volume commitment from FMPA to meet its material
7 commitment schedule. FMPA was not prepared to make a binding commitment
8 in the timeline necessary to meet this requested deadline. As a result, FGT
9 formally withdrew its offer of capacity to FMPA on May 1, 2008. However,
10 FMPA is continuing to explore other available options for serving Cane Island 4
11 and anticipates no problems in meeting the incremental natural gas demand of
12 this facility. Furthermore, FMPA has not ruled out acquiring firm natural gas
13 transportation from FGT in the future.

14
15 **Q. Are there any other natural gas transportation options that FMPA is**
16 **pursuing for Cane Island 4?**

17 A. Yes. There is the proposed East Coast Pipeline project being proposed by
18 Peoples Gas Systems, a TECO Energy subsidiary. This proposed pipeline
19 begins at the terminus of the Cypress Pipeline and runs along the east coast of
20 Florida and then inland to provide service to the Orlando area and will terminate
21 in the vicinity of the Cane Island Power Park. The project plans to interconnect
22 with Gulfstream in close proximity of Cane Island Power Park. This new
23 pipeline will have a capacity of approximately 300 MMcf/d. The Cypress
24 Pipeline supplies LNG from Southern Natural's Elba Island LNG facility. Cane

1 Island 4 would be supplied by BP Energy, who is discussing a bundled natural
2 gas supply and transportation deal with FMPA.

3

4 **Q. Has FMPA made any final decisions related which natural gas**
5 **transportation system will be used to serve Cane Island 4?**

6 A. No. At this time, FMPA is continuing to evaluate both the amount of
7 incremental firm natural gas transportation capacity needed to serve Cane Island
8 4 and which pipeline system will provide the best alternative for such service.

9

10 **Q. Is FMPA confident in its ability to secure firm natural gas transportation**
11 **capacity to reliably serve the needs of Cane Island 4?**

12 A. Yes. With the proposed natural gas supply expansion projects under way
13 throughout the State of Florida, FMPA is confident that adequate natural gas
14 transportation capacity will be available to provide reliable service for Cane
15 Island 4. The site being served by both FGT and Gulfstream offers FMPA the
16 opportunity to choose and/or reallocate gas transportation capacity to select the
17 best option available. The construction of a new generating unit in an area
18 served by two pipelines enhances the reliability of delivering natural gas to Cane
19 Island 4.

20

1 **Q. Have the costs associated with firm natural gas transportation been**
2 **accounted for in the economic evaluations presented in the Cane Island 4**
3 **Need for Power Application?**

4 A. Yes. The costs associated with incremental firm natural gas transportation
5 capacity are discussed in the testimony of Mr. Bradley Kushner.

6
7 **Q. How will Cane Island 4 be interconnected to the transmission system.**

8 A. Cane Island 4 will be interconnected to the existing Cane Island Substation. The
9 Cane Island substation is served by four 230 kV transmission lines including a
10 230 kV transmission line to TECO's Osceola Substation, a 230 kV transmission
11 line to OUC's Taft Substation, a 230 kV transmission line to Kissimmee Utility
12 Authority's Clay Street Substation, and a 230 kV transmission line to PEF's
13 Intercession City Substation.

14
15 **Q. Has FMPA requested Network Resource Interconnection Service (NRIS)**
16 **from PEF for Cane Island 4?**

17 A. Yes. FMPA has requested NRIS from PEF and PEF approved NRIS for Cane
18 Island 4 on March 31, 2008.

19
20 **Q. Has the FRCC reviewed the addition of Cane Island 4 to the transmission**
21 **system?**

22 A. Yes. The FRCC's Transmission Working Group (TWG) and Stability Working
23 Group (SWG) have reviewed the study conducted by FMPA for the
24 interconnection and integration of FMPA's Cane Island 4 based on the 2007

1 FRCC databank. Based on the review and analysis conducted by the TWG and
2 SWG, the FRCC Planning Committee determined on April 2, 2008 that the
3 proposed interconnection and integration plan will be reliable, adequate and will
4 not adversely impact the reliability of the FRCC transmission system.

5

6 **Q. Has FMPA explored the opportunity to install solar PV capacity**
7 **throughout the ARP member cities?**

8 A. Yes. FMPA issued a request for proposals specifically for solar PV equipment
9 or purchase power agreements (Solar RFP) on December 5, 2007.

10

11 **Q. Please describe the Solar RFP.**

12 A. The Solar RFP invited bidders to submit bids for the installation of 10 MW of
13 solar PV capacity by the end of 2008, with the potential for up to 100 MW of
14 solar PV capacity by 2013. Bidders were allowed to submit proposals ranging
15 from the supply of PV equipment, to the installation of turnkey solar project, to
16 a power purchase contract for energy generated by a solar system.

17

18 **Q. Did FMPA receive any bids in response to the Solar RFP?**

19 A. Yes. Twenty-six bids, some with multiple offerings, were received – 12
20 offering a power purchase agreement (PPA), 13 offering turnkey, or EPC,
21 installation of the equipment, and 7 offering to sell the equipment directly.

22

1 **Q. How were these bids evaluated by FMMPA?**

2 A. FMMPA solicited the expertise of OUC staff and the staff of the Florida Solar
3 Energy Center (FSEC) to be on a bid review team. The team met in January
4 2008 to review and rank the bids received in response to the solar RFP. The
5 results of the review team meeting were compiled and finalized.

6

7 **Q. What were the results of the bid evaluation process?**

8 A. All of the proposals were found to be above FMMPA's avoided costs and
9 therefore more expensive than traditional resources. However, FMMPA is
10 continuing to explore the potential use of solar technology as part of its
11 commitment to develop a balanced mix of power resources including renewable
12 technologies such as solar energy.

13

14 **Q. Is FMMPA currently considering any of these bids?**

15 A. Yes. FMMPA's Executive Committee approved the ranking of proposals
16 developed following FMMPA's evaluations. On April 4, 2008, FMMPA staff issued
17 an e-mail soliciting interest from FMMPA's ARP member cities to identify those
18 members which might have an interest in locating a solar photovoltaic (PV)
19 installation in their community. The various sites selected will require the
20 execution of agreements between the property owner, FMMPA, and the
21 contractor. FMMPA staff is currently working with one of the bidders to develop
22 a contract to bring to the ARP Executive Committee for their approval in May
23 2008.

24

1 **Q. Please describe FMPA's existing conservation and demand-side**
2 **management (DSM) programs.**

3 **A. As a wholesale electricity provider, FMPA does not directly provide**
4 **conservation and DSM programs to retail customers. The ARP members,**
5 **however, provide numerous conservation and DSM programs to their customers.**
6 **The following lists some of the programs provided.**

- 7 • Energy audits
- 8 • Energy saving tips
- 9 • Appliance and other rebates
- 10 • Load profiling for commercial customers
- 11 • Fix-up programs
- 12 • Tree planting incentives
- 13 • On-line energy audits
- 14 • Compact fluorescent bulbs
- 15 • ESCO projects
- 16 • City wide energy conservation programs
- 17 • Energy Star
- 18 • LED traffic signals

19 These programs are described in detail in Section 17.0 of the Cane Island Unit 4
20 Need for Power Application Exhibit No. __[FMPA-1].

21

1 **Q. Has FMPA made an effort to identify additional DSM measures?**

2 A. Yes. FMPA conducted an innovative request for proposals (RFP) process for
3 DSM resources. That process is discussed in the pre-filed testimony of Mr.
4 Nicholas Guarriello.

5
6 **Q. Is FMPA pursuing other conservation and DSM measures not identified in
7 the RFP for DSM resources?**

8 A. Yes. FMPA is pursuing a number of other conservation and DSM measures.
9 One innovative program that FMPA has been working on is a demand response
10 program with Publix Super Markets. This program would use Publix's standby
11 generators to reduce FMPA's peak demand. Since these standby generators
12 must be exercised periodically, their use to reduce FMPA's demand displaces
13 FMPA generation and reduces FMPA's CO₂ and other emissions.

14
15 **Q. How does FMPA support the ARP members in their conservation and DSM
16 programs?**

17 A. FMPA supports the ARP member conservation and DSM programs in a number
18 of ways. FMPA provides conservation and DSM training for the ARP members.
19 In addition, FMPA participates in numerous organizations and associations that
20 provide assistance to utilities in developing and operating conservation and
21 DSM programs. FMPA administers a contract with an energy services company
22 (ESCO) which works directly with ARP member commercial and industrial
23 customers to develop programs to reduce demand and energy. Section 17.0 of
24 the Cane Island 4 Need for Power Application Exhibit No. __ [FMPA-1]

1 describes in detail ways in which FMPA assists the ARP members in
2 implementing conservation and DSM programs.

3

4 **Q. Have conservation measures been utilized by FMPA and the ARP members**
5 **to the extent reasonably available?**

6 A. Yes. The ARP members are providing numerous conservation and DSM
7 measures. FMPA has done a thorough test of the available market for DSM
8 through its RFP process and is currently pursuing the reasonably available
9 alternatives.

10

11 **Q. Are there conservation measures reasonably available to FMPA and the**
12 **ARP members that mitigate the need for Cane Island 4.**

13 A. No. Cane Island 4 is still needed by FMPA even after the existing and
14 reasonably available conservation measures are considered.

15

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

17 A. Yes.

| ARP's Existing and Approved/Planned Resource Capacity ⁽¹⁾ | | | | | | |
|--|---------------|--------------|--------------|--------------|--------------|--------------|
| Generating Resources | Summer Rating | | | | | |
| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 - 2027 |
| Excluded Resources (Nuclear) ⁽²⁾ | 84 | 84 | 73 | 77 | 77 | 77 |
| Stanton Coal Plant ⁽³⁾ | 222 | 222 | 184 | 184 | 184 | 184 |
| Stanton Combined Cycle Unit A ⁽⁴⁾ | 45 | 45 | 45 | 45 | 45 | 45 |
| Cane Island 1-3 ⁽⁴⁾ | 383 | 383 | 383 | 383 | 383 | 383 |
| Indian River CTs | 80 | 80 | 80 | 80 | 80 | 80 |
| Stock Island 2-4 | 75 | 75 | 75 | 75 | 75 | 75 |
| Key West Native Generation | 41 | 41 | 41 | 41 | 41 | 41 |
| Kissimmee Native Generation | 47 | 47 | 47 | 47 | 0 | 0 |
| Lake Worth Native Generation | 89 | 89 | 89 | 0 | 0 | 0 |
| Vero Beach Native Generation | 138 | 138 | 0 | 0 | 0 | 0 |
| Treasure Coast Energy Center | 296 | 296 | 296 | 296 | 296 | 296 |
| Total Generating Capacity⁽⁵⁾ | 1,500 | 1,500 | 1,314 | 1,229 | 1,182 | 1,182 |
| Purchased Power | | | | | | |
| PEF Partial Requirements | 30 | 75 | 120 | 0 | 0 | 0 |
| FPL Long-Term Partial Requirements | 45 | 45 | 45 | 45 | 45 | 0 |
| Calpine Purchase | 100 | 100 | 0 | 0 | 0 | 0 |
| Stanton A Purchase ⁽⁶⁾ | 80 | 80 | 80 | 80 | 80 | 80 |
| Southern Power Company Power Purchase Agreement | 157 | 157 | 157 | 157 | 157 | 157 |
| Total Purchased Power Resources⁽⁵⁾ | 412 | 457 | 402 | 282 | 282 | 237 |
| Total Resources⁽⁵⁾ | 1,912 | 1,957 | 1,716 | 1,511 | 1,463 | 1,418 |

(1) Planned capacity prior to commercial operation of the Central Florida Power Project.
 (2) Reduction in 2010 reflects the withdrawal of Vero Beach from ARP. Increase in 2011 reflects planned upgrades.
 (3) Reduction in 2010 reflects the withdrawal of Vero Beach from ARP.
 (4) Includes FMPA and KUA ownership capacity.
 (5) Sums may not match FMPA totals due to rounding.
 (6) Includes FMPA and KUA capacity purchased from Southern Company Florida, LLC.

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RESUME OF
Thomas E. Reedy,
Assistant General Manager of the Power Resources Division
Florida Municipal Power Agency (FMPA)

Qualifications and Experience:

Since March of 2008, Mr. Reedy has served as the Assistant General Manager of the Power Resources Division of FMPA. Prior to his recent position, he was FMPA's Assistant General Manager, Members Services for four years.

Mr. Reedy has 30 years of experience in the electric utility industry. Mr. Reedy joined FMPA in 1995 and has held several positions during his tenure, including Member Services Coordinator, Director of Member Services, and most recently, Assistant General Manager, Member Services. Prior to joining FMPA, he served four years as an executive consultant for Resource Management International, Inc.

His background includes experience in cogeneration development, electric utility planning, electric utility dispatching and operations, forecasting and load research. At FMPA, his responsibilities include power supply and transmission planning, project development, power supply contracts, regulatory affairs, operations, and fuels.

Mr. Reedy holds a bachelor's degree in electrical engineering from the University of Florida in Gainesville, and he is a registered professional engineer in the state of Florida.

Employment

| | | |
|-----------------|--------------|---|
| History: | 1995-Present | FMPA |
| | 1991-1995 | Resource Management International, Inc. |

| | | |
|-------------------|------|---|
| Education: | B.S. | Electrical Engineering, University of Florida, Gainesville, FL |
|-------------------|------|---|

1 BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

2 DIRECT TESTIMONY OF JONATHAN P. NUNES

3 ON BEHALF OF

4 FLORIDA MUNICIPAL POWER AGENCY

5 DOCKET NO. _____

6 MAY 7, 2008

7

8 **Q. Please state your name and business address.**

9 A. My name is Jonathan P. Nunes. My business address is 1000 Legion Place,
10 Suite 1100, Orlando, Florida 32801.

11

12 **Q. By whom are you employed and in what capacity?**

13 A. I am employed by R. W. Beck as a Senior Economist.

14

15 **Q. Please describe your responsibilities in that position.**

16 A. As a Senior Economist in R. W. Beck's Generation Planning and Analysis
17 practice, I am responsible for providing consulting services in the areas of power
18 supply planning, financial planning and analysis, and modeling and systems
19 analysis. In particular, I have been responsible for numerous load forecasts in
20 support of power supply decisions, power plant need filings, wholesale and
21 retail rate planning, and budgeting for a variety of municipal and cooperative
22 utilities throughout the United States.

23

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1 **Q. Please describe R. W. Beck.**

2 A. R. W. Beck is a national management consulting and engineering firm with a
3 multi-disciplined staff of 550 with 26 offices in North America and one in
4 Singapore. R. W. Beck provides a variety of consulting and engineering
5 services across several industries, including energy, water, and solid waste. For
6 the energy industry, R. W. Beck provides power supply analysis, assistance with
7 Request for Power Supply Proposals (RFPs), independent engineering reviews
8 and financial feasibility assessments, appraisal evaluations, due diligence
9 reviews, transmission and distribution design services, construction
10 management, planning and owner's engineering services for generation and
11 transmission facilities, preparation of environmental reports, monitoring,
12 permitting, and licensing. Since its founding in 1942, some of the milestones
13 that the firm has achieved include:

- 14 • Provided independent engineering and feasibility assessments
15 associated with over \$150 billion in capital investment.
- 16 • Performed due diligence reviews and/or designed and engineered
17 over 400 power-related projects.

18

19 **Q. Please state your educational background and professional experience.**

20 A. I received a Bachelor of Science degree in Business Administration, Economics
21 from the University of Central Florida. I also received a Master of Arts degree
22 in Applied Economics from the University of Central Florida. I have over
23 14 years of experience in the utility industry.

24

1 **Q. Have you previously testified before the Florida Public Service**
2 **Commission?**

3 A. Yes. In the Taylor Energy Center Need for Power, my testimony regarding
4 FMPA's load forecast was stipulated to by all Parties.

5

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

7 A. The purpose of my testimony in this proceeding is to summarize the forecast of
8 electrical power demand and energy consumption for the Florida Municipal
9 Power Agency (FMPA) All-Requirements Project (ARP) developed by R. W.
10 Beck. This summary will include a brief description of the methodology of the
11 forecast, as well as the projected annual growth rates for summer and winter
12 peak demand and net energy for load.

13

14 **Q. Are you sponsoring any exhibits to your testimony?**

15 A. Yes. Exhibit No. __ [JPN-1] is a copy of my résumé.

16

17 **Q. Are you sponsoring any sections of Exhibit No. __ [FMPA-1], the Cane**
18 **Island 4 Need for Power Application?**

19 A. Yes. I am sponsoring Section 5.0, which was prepared under my direct
20 supervision.

21

1 **Q. Please briefly describe the methodology used to develop the load forecasts**
2 **for the All-Requirements Project.**

3 A. The ARP Load Forecast relies on an econometric approach to project electric
4 sales by major rate classification in the service territories of the ARP Members.
5 Econometric forecasting makes use of regression analysis to establish historical
6 relationships between energy consumption and various explanatory variables
7 based on fundamental economic theory and experience. These historical models
8 are evaluated and selected on their statistical ability to explain variations in
9 energy usage. The resulting models are then simulated using projections of the
10 explanatory variables to produce forecasts of energy sales. Forecasts of net
11 energy for load and peak demand are then derived from the energy sales forecast
12 based on assumed loss and load factors, generally based on recent historical
13 averages of these factors. Finally, the total ARP energy requirements and peak
14 demand are based on summations of these load determinants across the
15 Members supplied by the ARP and, in the case of coincident peak demand,
16 assumed coincidence factors generally based on recent historical averages.
17 Sections 5.4 through 5.7 of Exhibit No. __ [FMPA-1] summarize the general
18 methodology used to forecast load for each rate classification.
19

20 **Q. Are there any changes to the ARP Members during the forecast period?**

21 A. Yes. The City of Vero Beach has provided FMPA with its *Notice of*
22 *Establishment of Contract Rate of Delivery (CROD)*. The load forecast was
23 developed assuming that Vero Beach's CROD becomes effective January 1,
24 2010. The effect of the notice on the forecast is that Vero Beach's load will no

1 longer be included in the ARP load forecast once Vero Beach's CROD becomes
2 effective. Also, the City of Fort Meade is included in the forecast beginning
3 January 2009, at which time the ARP will begin serving its electricity needs.
4

5 **Q. Please summarize the ARP's Base Case forecast summer peak demand.**

6 A. The forecast 2008 summer peak demand is 1,545 MW, and the 2026 forecast
7 summer peak demand is 2,077. The summer peak demand is projected to grow
8 at a rate of 3.2 percent from 2008 to 2009, which reflects the addition of
9 Fort Meade, and at an average annual rate of 2.2 percent for 2010 through 2026.
10

11 **Q. Please summarize the ARP's Base Case forecast winter peak demand.**

12 A. The forecast 2008 winter peak demand is 1,427 MW, and the forecast 2026
13 winter peak demand is 1,878 MW. The winter peak demand is projected to
14 grow at a rate of 3.2 percent from 2008 to 2009, which reflects the addition of
15 Fort Meade, and at an average annual rate of 2.2 percent from 2010 through
16 2026.
17

18 **Q. What is the ARP's Base Case forecast net energy for load?**

19 A. The forecast 2008 net energy for load is 7,655 GWh and the forecast net energy
20 for load in 2026 is 10,233 GWh. The NEL is expected to grow at a rate of
21 3.1 percent from 2008 to 2009, which reflects the addition of Fort Meade, and at
22 an average annual rate of 2.2 percent from 2010 to 2026.
23

1 **Q. How are the changes to ARP members discussed previously in your**
2 **testimony reflected in the peak demand and net energy for load projections**
3 **you just summarized?**

4 A. The growth rate from 2008 to 2009 includes the addition of the Fort Meade load
5 following expiration of its existing full requirements agreement with TECO as
6 discussed above. Growth rates have been shown separately for the 2008 to 2009
7 and 2010 through 2026 periods to avoid distortion due to Vero Beach's
8 establishment of CROD, effective January 1, 2010. All values decrease from
9 2009 to 2010 as a result of the removal of Vero Beach loads beginning in 2010.

10

11 **Q. Were any alternative load forecasts developed?**

12 A. Yes. In addition to the Base Case forecast that I just described, high and low
13 case projections were developed to reflect various assumptions regarding future
14 levels of population and economic activity. These high and low case forecasts
15 are intended to capture 90 percent of the uncertainty in these long-term driving
16 variables (1.7 standard deviations). Summaries of the results of the high case
17 and low case forecasts are presented in Table 5-4 of Exhibit No. __ [FMPA-1].

18

19 **Q. In your opinion, are the assumptions used in the load forecasts reasonable**
20 **for planning purposes?**

21 A. Yes. The methodology used to estimate and simulate the forecasting equations
22 is commonly accepted and widely used in the utility industry. The estimated
23 parameters of the forecasting equations benchmark well against economic
24 theory and the results of similar analyses done elsewhere. Economic data was

1 provided by Economy.com, a nationally-recognized provider of such data.
2 Historical and normal weather data, on which the load forecast is based, were
3 provided by the National Oceanic and Atmospheric Administration, a widely
4 used source for weather data.

5

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

7 **A. Yes.**

RESUME OF
Jonathan P. Nunes, Senior Economist

R. W. Beck, Inc.

Qualifications and Experience:

Mr. Nunes has been with R. W. Beck since 1993. Since joining the firm, he has provided consulting services in the areas of power supply planning, financial planning and analysis, and econometric analysis. In particular, he has been responsible for numerous load forecasts in support of power supply decisions, certificate of need filings, wholesale and retail rate planning, and budgeting for a variety of utilities throughout the United States. Although his work has focused on load-serving electric utilities, Mr. Nunes has also provided consulting services to merchant power plant developers, solid waste collection agencies, local governments, and large industrial manufacturers.

Mr. Nunes has a Master of Arts degree in Applied Economics from the University of Central Florida and a Bachelor of Science degree in Business Administration, Economics from the University of Central Florida.

Power Supply Planning and Analysis

- Long-term Load Forecasting
- Hourly Load Forecasting

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- Power Supply Analyses
- Energy Risk Management

Mr. Nunes has been responsible for numerous long-term electric load forecasts and related analyses for various municipal utilities, joint-action agencies, and cooperatives. These efforts have included the development of forecasting processes from the ground up and the supervision of other staff, including client staff, in prosecuting portions of the analytical work. Mr. Nunes has taken a lead role in the development of forecasting techniques and historical data analyses to develop base-line forecasts and the sensitivity of those forecasts to varying economic and weather assumptions.

Mr. Nunes has also been responsible for the development of hourly load forecasting models for various clients to facilitate the scheduling of power supply resources and forward sales. These models have relied on a combination of econometric and univariate techniques to maximize the accuracy of the resulting forecast.

Mr. Nunes has also been involved in the evaluation of power supply options, including joint power supply arrangements, and the negotiation of power supply contracts. This work has incorporated the simulation of the utilities' power supply arrangements and typically utilizes scenario planning and probabilistic analytical techniques to assess the range of potential results and clients' risk exposure.

Financial Planning and Analysis

- Utility Cost of Service
- Rate Design
- Stranded Cost Analysis
- Asset Valuation

Mr. Nunes has been involved in numerous analyses and reports related to energy sector clients' cost of service, wholesale and retail rates, and annual budgets. His responsibilities have included the projection of utility cost of service and associated wholesale and retail electric rates, including the investigation of alternative financing options, rate stabilization strategies, and rate structures. In addition, Mr. Nunes has been involved in the preparation of Consulting Engineer's reports for Official Statements and annual reports as required by bond resolutions.

Mr. Nunes has been involved in various studies to assist clients in preparing for increased competition in power supply. In particular, he has been involved in the development of stranded cost estimates for various utilities and associated impact on competitive rates of various recovery methodologies. Mr. Nunes has also been involved in the development of a computer model to assist municipal clients in analyzing the benefits of the ownership of their distribution system and the impact of deregulation on their system and customers. In addition, Mr. Nunes has assisted clients in the development of pricing and service strategies aimed at customer retention and securing long-term retail power supply contracts.

Econometric Analysis

Mr. Nunes has been responsible for numerous modeling assignments for clients in the energy and solid waste industries. These models have primarily involved the use of econometric analysis to establish the influence of various factors on important decision variables. In the energy sector, this work has included development of an econometric model of the United States natural gas market, the estimation of power plant output at critical temperatures and pressures, and estimates of the future demand for primary and after-market power plant equipment based on electricity demand, the size of the fleet, and operating characteristics.

In the solid waste industry, Mr. Nunes was responsible for the gathering, management, and analysis of waste composition and building characteristics data to determine the factors that influence recycling success. This was part of a larger project to assist the strategic planning efforts of a major city in the Northeast United States. Mr. Nunes was also involved in the development of a solid waste characterization model that estimates the composition of a community's solid waste based on the characteristics of the community. The estimate relies on a series of regression models that take into account economic and demographic variables and recycling penetration. Mr. Nunes also developed econometric forecasts of the amount of solid waste generation by county in Pennsylvania for the Pennsylvania Department of Environmental Protection.

Employment

History: 1993-Present R. W. Beck, Inc.

Education: M.A. Applied Economics, University of Central Florida
 B.S. Business Administration/Economics, University of
 Central Florida

1 BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

2 DIRECT TESTIMONY OF MYRON R. ROLLINS

3 ON BEHALF OF

4 FLORIDA MUNICIPAL POWER AGENCY

5 DOCKET NO. _____

6 MAY 7, 2008

7

8 **Q. Please state your name and business address.**

9 A. My name is Myron R. Rollins. My business address is 11401 Lamar Avenue,
10 Overland Park, Kansas 66211.

11

12 **Q. By whom are you employed and in what capacity?**

13 A. I am employed by Black & Veatch Corporation. My current position is
14 Director.

15

16 **Q. Please describe your responsibilities in that position.**

17 A. I am responsible for the management of various projects for utility and non-
18 utility clients. These projects encompass a wide variety of services for the
19 power industry. The services include load forecasts, conservation and demand
20 side management, reliability criteria and evaluation, development of generating
21 unit addition alternatives, fuel forecasts, screening evaluations, production cost
22 simulations, optimal generation expansion modeling, economic and financial
23 evaluation, sensitivity analysis, risk analysis, power purchase and sales
24 evaluation, strategic considerations, analyses of the effects of environmental

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1 regulations, feasibility studies, qualifying facility and independent power
2 producer evaluations, power market studies, and power plant financing.

3

4 **Q. Please describe Black & Veatch.**

5 A. Black & Veatch Corporation has provided comprehensive engineering,
6 consulting, and management services to utility, industrial, and governmental
7 clients since 1915. Black & Veatch specializes in engineering, consulting, and
8 construction associated with utility services, including electric, gas, water,
9 wastewater, telecommunications, and waste disposal. Service engagements
10 consist principally of investigations and reports, design and construction,
11 feasibility analyses, rate and financial reports, appraisals, reports on operations,
12 management studies, and general consulting services. Present engagements
13 include work throughout the United States and numerous foreign countries.

14

15 **Q. Please state your educational background and experience.**

16 A. I received a Bachelor of Science degree in Electrical Engineering from the
17 University of Missouri – Columbia. I also have two years of graduate study in
18 Nuclear Engineering at the University of Missouri – Columbia. I am a licensed
19 professional engineer and a Senior Member of the Institute of Electrical and
20 Electronic Engineers.

21

22 I have 32 years of experience in the power industry specializing in generation
23 planning and project development. In the past ten years, I have been the project
24 manager for over 100 projects, the vast majority of which have been for Florida

1 utilities. Florida utilities for which I have worked include Florida Municipal
2 Power Agency (FMPA), Kissimmee Utility Authority, Lakeland Electric,
3 Orlando Utilities Commission (OUC), JEA, City of Tallahassee, Reedy Creek
4 Improvement District, City of St. Cloud, Utilities Commission of New Smyrna
5 Beach, Sebring Utilities Commission, City of Homestead, Florida Power
6 Corporation, Tampa Electric Company, and Seminole Electric Cooperative.

7
8 I was responsible for the development of Black & Veatch's POWRPRO
9 chronological production costing program and POWROPT optimal generation
10 expansion program. I am also responsible for power market analysis and project
11 feasibility studies. I have been responsible for supporting need for power
12 petitions on a number of power plants in Florida including Stanton 1, 2, A,
13 and B; Cedar Bay; Cane Island 3; McIntosh 5; the Brandy Branch Combined
14 Cycle Conversion, and Treasure Coast Unit 1;. I also participated in the need
15 for power proceeding for the Hardee and Hines projects. I have presented expert
16 testimony on several occasions before the Alaska, Indiana, Missouri, and Florida
17 public service commissions and have presented numerous papers on strategic
18 planning and cogeneration.

19
20 **Q. What is the purpose of your testimony in this proceeding?**

21 A. The purpose of my testimony is to provide an overview and summary of the
22 Cane Island 4 Need for Power Application, Exhibit No. __ [FMPA-1]. In
23 addition to this general summary, I will discuss the economic parameters used in
24 the economic analyses of Cane Island 4. I will provide an overview of the Cane

1 Island 4 project and discuss considerations made in determining not to include
2 fuel oil backup on the proposed unit. I will also discuss the reliability criteria
3 used by FMPA and the projected need for additional capacity to satisfy these
4 criteria.

5

6 **Q. Are you sponsoring any exhibits to your testimony?**

7 A. Yes. Exhibit No. __ [MRR-1] is a copy of my résumé. Exhibit No. __ [MRR-2]
8 is a summary of the Cane Island 4 capital cost estimate. Exhibit No. __
9 [MRR-3] is a summary of the Cane Island 4 estimated performance.

10

11 **Q. Are you sponsoring any sections of the Cane Island 4 Need for Power**

12 **Application, Exhibit No __ [FMPA-1]?**

13 A. Yes. I am sponsoring Sections 1.0, 2.0, 4.0, 9.0, 10.0, 12.0, and 13.0, all of
14 which were prepared by me or under my direct supervision.

15

16 **Q. Please summarize the Cane Island 4 Need for Power Application, Exhibit**

17 **No. __ [FMPA-1].**

18 A. FMPA is submitting the Cane Island 4 Need for Power Application in support of
19 a proposed natural gas-fired “combined cycle” electric generating unit to be
20 located at the existing Cane Island generating station in Osceola County,
21 Florida.

22

1 Exhibit No. __ [FMPA-1] presents the results of a comprehensive analysis that
2 was performed to demonstrate that the proposed Cane Island 4 satisfies all of the
3 statutory criteria set forth in Section 403.519 Florida Statutes.

4

5 **Q. Please discuss these statutory criteria.**

6 A. Section 403.519(3), Florida Statutes, sets forth the following criteria which the
7 Commission must consider in making need determinations:

- 8 • The need for electric system reliability and integrity.
- 9 • The need for adequate electricity at a reasonable cost.
- 10 • The need for fuel diversity and supply reliability.
- 11 • Whether the proposed plant is the most cost-effective alternative
12 available.
- 13 • Whether renewable energy sources and technologies, as well as
14 conservation measures, are utilized to the extent reasonably available.
- 15 • Whether there are conservation measures taken by or reasonably
16 available to the applicant or its members which might mitigate the need
17 for the proposed plant.

18

19 **Q. Please summarize the process used to determine that Cane Island 4 met**
20 **each of these statutory criteria.**

21 A. FMPA went through a multistage evaluation process to ensure the proposed
22 Cane Island 4 is consistent with the criteria in Section 403.519(3).

23

1 The first step involved developing detailed cost and performance estimates for
2 Cane Island 4. These estimates are presented in Section 9.0 of Exhibit No.
3 __[FMPA-1] and are discussed in more detail later in my testimony.

4
5 The second step involved the development of cost and performance estimates
6 for numerous natural gas-fired supply-side alternatives to Cane Island 4. These
7 supply-side alternatives included simple cycle combustion turbines and a
8 combined cycle alternative identical to the proposed Cane Island 4. These
9 alternatives are discussed in the testimony of Mr. Bradley Kushner.

10
11 FMPA issued four separate requests for proposals (RFPs) to identify alternatives
12 to the construction of the proposed Cane Island 4. These four RFPs included a
13 power supply RFP soliciting proposals for purchase power, an RFP soliciting
14 renewable sources of capacity and energy; an RFP seeking demand-side
15 management (DSM) services; and an RFP for solar photovoltaic resources. The
16 RFP processes are discussed in the testimony of Mr. Nicholas Guarriello and
17 Mr. Thomas Reedy.

18
19 Detailed economic evaluations were performed to evaluate the proposed Cane
20 Island 4 as well as the bids received in response to the four RFPs. The
21 methodology and results of these evaluations are discussed in the testimony of
22 Mr. Bradley Kushner. As Mr. Kushner explains in detail, construction of Cane
23 Island 4 in May 2011 represents the most cost-effective resource addition under
24 all of the scenarios and sensitivities evaluated, which included consideration of

1 new renewable and demand-side management projects identified in the RFP's
2 and being considered by FMPA.

3

4 **Q. Please describe the economic parameters used in the Cane Island 4 Need for**
5 **Power Application, Exhibit No. __ [FMPA-1].**

6 A. A 2.3 percent annual general inflation rate was used. Escalation rates of
7 2.3 percent annually were used for capital and O&M costs. An annual rate of
8 5.0 percent was used for the long-term tax-exempt bond interest rate, interest
9 during construction rate, and present worth discount rate. Alternatives were
10 evaluated over a 20 year planning period from 2008 through 2027.

11

12 **Q. What is the fixed charge rate?**

13 A. The fixed charge rate (FCR) represents the sum of a project's fixed charges as a
14 percent of the initial investment cost. When the FCR is applied to the initial
15 investment, the product equals the revenue requirements needed to offset the
16 fixed charges during a given year.

17

18 **Q. What were the financing terms used in your assumptions?**

19 A. Simple cycle combustion turbines were assumed to have a 25 year financing
20 term, while natural gas fired combined cycle units were assumed to be financed
21 over 30 years.

22

1 **Q. What fixed charge rates were used in the evaluation of Cane Island 4?**

2 A. The levelized FCR calculations assume a 2.0 percent bond issuance fee, an
3 assumed 0.50 percent annual property insurance cost, and a debt service reserve
4 fund equal to 100 percent of the average annual debt service requirement
5 earning interest at an interest rate equal to the bond interest rate. The resulting
6 25 year fixed charge rate is 7.824 percent and the 30 year fixed charge rate is
7 7.194 percent.

8

9 **Q. Are these economic parameters appropriate for use in this Need for Power**
10 **Application?**

11 A. Yes. They are consistent with economic parameters that we have been using in
12 similar evaluations before the Commission and more importantly, they are
13 internally consistent across all the evaluations.

14

15 **Q. Please describe the proposed Cane Island 4 project.**

16 A. The proposed Cane Island 4 is a 1x1 F class combined cycle unit with a nominal
17 rating of 300 MW at average temperature conditions. The unit will be installed
18 at the existing Cane Island Power Park (CIPP) site which is located near
19 Intercession City, in Osceola County, Florida. The unit will be interconnected
20 with the existing CIPP substation.

21

22 Cane Island 4 will include supplemental firing and evaporative cooling. The
23 unit will include steam turbine bypass to the condenser to allow operation in
24 simple cycle mode if an extended steam turbine generator outage occurs.

1 Cooling tower makeup will be provided by Toho Water Authority via an
2 existing pipeline. In addition, four new onsite wells will be provided for backup
3 cooling tower makeup water supply. Cooling tower blowdown and other
4 process wastewaters will be returned to the Toho Water Authority pipeline.

5
6 **Q. How was the Cane Island 4 capital cost estimate developed?**

7 A. The capital cost estimate was based on building a new 1x1 7FA combined cycle
8 generating unit at the existing CIPP near Intercession City, Florida. The capital
9 cost estimate includes direct costs for purchased equipment and materials,
10 construction contract costs, and indirect costs. Direct costs include the costs
11 associated with the purchase of equipment, erection, and all contractor services.

12
13 Construction costs were developed on the basis of an EPC contract. It was
14 assumed that construction would be performed using a 50 hour work week, with
15 some 60 hour work weeks. Local labor craft rates used included payroll, payroll
16 taxes, and benefits. Construction indirects and construction equipment costs
17 were included in the construction and service contracts portion of the estimate.

18
19 Indirect costs associated with construction were included in the base cost
20 estimate. General indirect costs included all necessary services required for
21 checkouts, testing services, and commissioning. Insurance for general liability
22 was included. Contractor engineering, contractor field construction
23 management, technical direction, contingency, profit, equipment transportation

1 costs, startup, and commissioning were also included. Owner's costs were
2 estimated on the basis of FMPPA's experience with other similar projects.

3

4 **Q. What is the resulting capital cost estimate for Cane Island 4?**

5 A. The capital cost estimate for Cane Island 4 is approximately \$421,600,000. This
6 estimate includes equipment costs, EPC costs (direct and indirect), project
7 contingency, and owner's costs. The capital cost estimate also includes interest
8 during construction and is representative of an installed, in-service cost estimate
9 for May 2011 commercial operation of Cane Island 4. The capital cost estimate
10 is presented in Exhibit No. __ [MRR-2].

11

12 **Q. Please summarize the operating and maintenance (O&M) cost estimates
13 developed for Cane Island?**

14 A. Fixed and nonfuel variable O&M cost estimates were developed for Cane Island
15 4. Fixed costs include labor, payroll burden, fixed routine maintenance, and
16 administration costs. Variable O&M costs include consumables, chemicals,
17 lubricants, water, and major inspections and overhauls.

18

19 The fixed O&M cost estimate for Cane Island 4 is \$4.56/kW-year, and the
20 nonfuel variable O&M cost estimate for Cane Island 4 is \$3.30/MWh. These
21 estimates are presented in 2008 dollars.

22

1 **Q. Please summarize the estimated performance of Cane Island 4.**

2 A. Performance estimates were developed for various ambient conditions at various
3 load points. Non-recoverable output and net plant heat rate (NPHR) degradation
4 factors were applied to the new-and-clean net output and NPHR estimates. The
5 resulting degraded net plant output and NPHR estimates are summarized in
6 Exhibit No. __[MRR-3].

7
8 **Q. Will Cane Island 4 be designed to operate on fuel oil as a backup fuel
9 source?**

10 A. No. In reviewing the projected operation of Cane Island 4, FMPA has
11 concluded that the potential reliability benefits of including oil backup capability
12 in this unit are overshadowed by the incremental costs, maintenance, and limited
13 reliability benefits associated with this capability.

14
15 **Q. Are there any State or Federal requirements for oil backup capability?**

16 A. No.

17

18 **Q. Will fuel supply reliability be maintained for Cane Island 4 without having
19 dual fuel capability?**

20 A. Yes. Historically, utilities proposed dual fuel capability because natural gas was
21 supplied to Florida through a single natural gas pipeline. The single pipeline
22 was subject to disruptions affecting the supply for all the natural gas usage in the
23 state. The possibility of natural disasters (such as hurricanes that could affect
24 the predominant supply source in the Gulf of Mexico) has caused concern of

1 natural gas curtailments within Florida. However, as the natural gas
2 transportation network has expanded and supply sources and storage have
3 become more diverse, the probability that a hurricane or other natural disaster
4 could or would disrupt natural gas supplies to the state has decreased.

5
6 **Q. Has the FPSC approved need applications for other natural gas fueled
7 projects that do not include oil backup?**

8 A. Yes. The FPSC approved Florida Power & Light Company's Manatee Unit 3
9 project without oil backup. Like the Cane Island site, Manatee Unit 3 has access
10 to natural gas transportation service from both FGT and Gulfstream. Access to
11 dual pipelines dramatically increases the reliability of natural gas supplies.

12
13 **Q. Was the incremental capital cost for fuel oil backup been estimated for
14 Cane Island 4?**

15 A. Yes. The incremental capital cost for dual fueled capability for Cane Island 4
16 was estimated to be approximately \$13.0 million. Several additional problems
17 with dual fuel operation could be quantified and would result in significant
18 additional cost when viewed from the utility's perspective.

19
20 **Q. Were other non-price related factors considered in determining not to
21 include oil backup for Cane Island 4?**

22 A. Yes. Although oil backup for generating units may potentially enhance system
23 reliability, there is a limit to the value in requiring that all units include this
24 capability. In the event of a total and prolonged gas outage, many units that

1 have oil backup will not be able to operate as required because of the extreme
2 difficulty in continuously providing fuel oil by truck. Recent improvements to
3 the Florida natural gas supply network have also increased the diversity and
4 reliability of the gas supply, further reducing the need for dual fuel capability on
5 every new natural gas fueled generating unit proposed in the State.

6
7 Other specific factors taken into consideration related to inclusion of oil backup
8 include:

- 9 • Increased demineralized water consumption resulting from water
10 injection when operating on fuel oil.
- 11 • Increased air permitting requirements and greater emissions.
- 12 • Increased operations and maintenance costs to maintain and test the
13 added equipment including test firing on fuel oil.
- 14 • Increased permit requirements due to increased water consumption and
15 wastewater disposal.
- 16 • Increased environmental compliance requirements during operation of
17 the plant.
- 18 • Increased probability of forced outage due to increased equipment
19 complexity.
- 20 • Deterioration of stored fuel resulting in chance of failure when switching
21 to fuel oil or starting on fuel oil.

22

1 **Q. How reliable has the natural gas supply been to the Cane Island Power**
2 **Park?**

3 A. Very reliable. Since the first unit went into operation at Cane Island in 1995, oil
4 has only been burned a total of 77 hours. That is equivalent to an additional
5 forced outage rate of only 0.07 percent.

6

7 **Q. Do FMPA's other natural gas units have oil backup.**

8 A. Yes.

9

10 **Q. How does Cane Island 4 relate to FMPA's planning reserve margin?**

11 A. The capacity from Cane Island 4 will be equivalent to approximately 19.9
12 percent of FMPA's projected 2011 summer demand. Thus Cane Island 4 is
13 essentially equal to FMPA's reserve margin and the loss of the unit will
14 generally not affect FMPA's ability to serve load.

15

16 **Q. How does FMPA determine its reserve requirements?**

17 A. FMPA determines its reserve requirements by comparing net system capacity
18 and system peak demand plus reserves for the summer and winter peaks. FMPA
19 adheres to a minimum 18 percent reserve margin in summer and a minimum 15
20 percent reserve margin in winter. The planning reserve margin covers
21 uncertainties in extreme weather, forced outages for generators, and uncertainty
22 in load forecasts. FMPA plans to maintain the 18 percent reserve margin only
23 for firm load obligations. Interruptible load and curtailable load are not
24 considered in setting the 18 percent reserve margin.

1 **Q. Please describe FMPA's expected need for additional capacity to satisfy**
2 **reserve margin requirements under the base case load forecast.**

3 **A. Based on FMPA's existing and approved/planned capacity resources (discussed**
4 **in the testimony of Mr. Thomas Reedy) and the base case load forecast**
5 **(discussed in the testimony of Mr. Jonathan Nunes), FMPA is projected to**
6 **require additional capacity to maintain its 18 percent summer reserve margin**
7 **beginning in the summer of 2010. By the summer of 2011, FMPA's reserve**
8 **margin is projected to fall to negative 1.3 percent, or 286 MW below the**
9 **capacity required in order to maintain an 18 percent reserve margin. Projected**
10 **summer capacity deficits continue to increase beyond 2011, growing to an**
11 **estimated deficit of 363 MW by 2012.**

12

13 **Q. Does this conclude your pre-filed testimony?**

14 **A. Yes.**

RESUME OF
MYRON R. ROLLINS

Black & Veatch

Director

*Project Management;
Integrated Resource
Planning; Permitting
and Licensing;
Feasibility Studies and
Project Development*

Mr. Rollins is a Director in Enterprise Management Solutions. He is responsible for management of system planning and feasibility studies encompassing the areas of integrated resource planning, load forecasting, generation planning, cogeneration, site selection, and other special studies.

Mr. Rollins specializes in generation planning and project development. He is responsible for numerous power supply studies incorporating integrated planning techniques. Mr. Rollins was responsible for the development of Black & Veatch's POWRPRO chronological production costing program and POWROPT optimal generation expansion program. He is also responsible for power market analysis and project feasibility studies. Mr. Rollins extends his expertise in generation system planning to the area of need for power certification of power plants.

Education

Bachelors, Electrical, University of Missouri at Columbia, 1974

Professional Registration

Engineer (PE), Missouri, 1982

Total Years Experience

32

Joined B&V

1976

Professional Associations

MoKan American Nuclear Society – Past President
Institute of Electrical and Electronics Engineers – Senior Member

Language Capabilities

English

Mr. Rollins has broad expertise in planning and project development that enables him to assist clients in the development of expansion plans and specific projects in a realistic manner that incorporates the required balance between engineering and cost considerations as well as sociopolitical and licensing considerations. With this experience, Mr. Rollins has successfully helped utility and developer clients add value to their systems and projects throughout his career.

Mr. Rollins has presented expert testimony on several occasions before the Alaska, Florida, Indiana and Missouri Public Service Commissions, and has published numerous papers on strategic planning and cogeneration. He is past chairman of the Mo-Kan section of the American Nuclear Society and a senior member of IEEE.

Representative Project Experience

*Need for Power Certification, Orlando Utilities Commission, Florida
2005-2006*

Project Manager. Managed the preparation of a Need for Power Application for Orlando Utilities Commission's Stanton Energy Center Unit B. Stanton B is a proposed IGCC unit to be constructed at Stanton Energy Center in Orlando, Florida. The application was submitted to the Florida Public Service Commission under the Electrical Power Plant Siting Act. The Need for Power Application evaluated Stanton B against

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other self-build alternatives and demand-side management alternatives. The Florida Public Service Commission unanimously approved the need for Stanton B.

Need for Power Certification, Florida Municipal Power Agency, Florida

2005

Project Manager. Managed the preparation of a Need for Power Application for Florida Municipal Power Agency's (FMPA's) Treasure Coast Energy Center (TCEC) Unit 1. TCEC Unit 1 is a proposed 1x1 F class combined cycle unit to be constructed on a greenfield site in Ft. Pierce, Florida. The application that was submitted to the Florida Public Service Commission under the Florida Electrical Power Plant Siting Act. The Need for Power Application evaluated TCEC Unit 1 against other self-build alternatives, purchase power from a request for proposals (RFP) process, and demand-side management alternatives. The Florida Public Service Commission unanimously approved the need for TCEC Unit 1.

Integrated Resource Plan, City of Tallahassee, Florida

2005-2006

Project Manager. Managing an integrated resource plan (IRP) for the City of Tallahassee. The IRP involves extensive evaluation of gas and coal fueled alternatives. More than 140 demand-side management (DSM) measures were evaluated. The IRP includes extensive evaluation of the impacts from the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR). Biomass generation was evaluated as part of the IRP. Extensive probabilistic risk analysis was also conducted.

Integrated Resource Plan, JEA, Florida

2005-2006

Project Manager. Managing an integrated resource plan (IRP) in conjunction with JEA. The IRP involves extensive evaluation of gas and coal fueled alternatives including the development of site-specific estimates. Requirements for the Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) were included in determining air quality control additions necessary for existing units. Demand-side management (DSM) evaluation made use of previous work conducted by Black & Veatch as part of JEA's Conservation Goal Docket before the Florida Public Service Commission.

Integrated Resource Plan Review, City of Lakeland, Florida

2005

Project Manager. Managed the review of the development of the City of Lakeland's integrated resource plan (IRP). The review encompasses all aspects of the IRP including load forecast, fuel forecast, development of supply side alternatives, life extension, and expansion planning. In

addition, Black & Veatch evaluated demand-side management alternatives for the City of Lakeland.

***Expert Testimony, Indiana Municipal Power Agency, Indiana
2004***

Project Manager. Presented expert testimony before the Indiana Utility Regulatory Commission for issuance of a Certificate of Public Convenience and Necessity. The testimony covered the technical and economic feasibility for three coal generating unit projects in which the Indiana Municipal Power Agency planned to participate.

***St. Johns River Power Park Annual Report, JEA, Florida
2004***

Project Manager. Managed preparation of the annual report on the operation and maintenance of St. Johns River Power Park consisting of two 675 MW pulverized coal units burning a mix of coal and petroleum coke. The units are jointly owned by Florida Power & Light Company and JEA. The annual operation and maintenance report is required to be submitted to the bond trustee under JEA's bond covenants.

***Ten Year Site Plan, Orlando Utilities Commission, Florida
2004***

Project Manager. Managed the preparation of the Ten Year Site Plan for Orlando Utilities Commission as required by the Florida Public Service Commission. The Ten Year Site Plan is an integrated resource expansion plan for the utility including load forecast, fuel price forecast, demand side management, and generation expansion.

***Stock Island Combustion Turbine Unit 4 Development and Licensing,
Florida Municipal Power Agency, Florida
2004***

Project Manager. Managed development of the project description, the conceptual design, the development of lease and operating agreements, and permitting and licensing of a LM6000 simple cycle combustion turbine located at Key West, Florida. In addition, studies of the method of project execution, either EPC or traditional design and construction management, were developed along with a detailed schedule and cost estimate.

***Combined Cycle Site Selection Study, Florida Municipal Power
Agency, Florida
2004***

Project Manager. Managed the site selection study for a 1x1 F class combined cycle for Florida Municipal Power Agency (FMPA). The site selection study initially evaluated four FMPA member generation sites. From those four sites, two were selected for detailed evaluation. The site selection study evaluated fatal flaws and permitting requirements, natural gas supply, water supply, wastewater disposal, and transmission

interconnection requirements. The study evaluated construction and operating costs differences between the two sites. The study also evaluated the ability to deliver power to the East system and the associated economic impacts of wheeling costs to get power to the East system. The study recommended selection of a site in St. Lucie County. Final permitting is currently under way for construction of the unit.

***Independent Assessment, Edwards & Angell, Florida
2003***

Project Manager. Managed an independent assessment of the current state and cost to complete of a partially completed combined cycle repowering project in Lake Worth, Florida for Edwards & Angell, the City of Lake Worth's bond attorney. The study involved developing an estimate to complete the project as a simple cycle combustion turbine and providing consultation on the development of a new natural gas transportation agreement and a memorandum of understanding between the existing owner, AES, and the new purchaser of the project, Florida Municipal Power Agency. The assignment also involved review and advise on numerous other project agreements.

***Cane Island 4 Feasibility Study, Florida Municipal Power Agency,
Florida
2002***

Project Manager. Managed a feasibility study for the installation of a 1 x 1 F class combined cycle at the existing Cane Island Power Park. The study addressed site arrangement, the availability of cooling water, and the disposal of wastewater.

| Cane Island 4 In-Service Capital Cost Estimate (\$000) | |
|---|---------|
| Item | |
| Combustion Turbine/Steam Turbine | 48,400 |
| EPC | 246,900 |
| Contingency | 25,000 |
| Owner's Costs | 69,500 |
| Total Project Costs | 389,800 |
| Interest During Construction | 31,800 |
| Total Installed Capital Cost | 421,600 |

| Estimated 1x1 F Class Combined Cycle Performance | | |
|---|------------------|-------------------------------|
| Performance Point | Unit Output (kW) | Unit Heat Rate (Btu/kWh, HHV) |
| Winter (19° F and 58% relative humidity) (Full Load) | 329,800 | 7,435 |
| Summer (102° F and 33% relative humidity) (Full Load) | 299,600 | 7,445 |
| Average (73° F and 80% relative humidity) (Full Load with Duct Firing) | 307,200 | 7,420 |
| Average (73° F and 80% relative humidity) (Full Load without Duct Firing) | 246,990 | 6,969 |
| Average (73° F and 80% relative humidity) (75% Load) | 192,110 | 7,289 |
| Average (73° F and 80% relative humidity) (50% Load) | 140,990 | 7,923 |

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF JASON L. WOLFE

ON BEHALF OF

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. _____

MAY 7, 2008

Q. Please state your name and business address.

A. My name is Jason Wolfe. My business address is 1000 Legion Place, Suite 1100, Orlando, Florida 32801.

Q. By whom are you employed and in what capacity?

A. I am employed by R.W. Beck. My current position is Senior Analyst.

Q. Please describe R.W. Beck.

A. R.W. Beck is a national management consulting and engineering firm with a multidisciplined staff of 550 with 26 offices in North America and one in Singapore. R.W. Beck provides a variety of consulting and engineering services across several industries, including energy, water, and solid waste. For the energy industry, R.W. Beck provides power supply analysis, assistance with requests for proposals (RFPs); independent engineering reviews and financial feasibility assessments; appraisal evaluations; due diligence reviews; transmission and distribution design services; construction management; planning and owner's engineering services for generation and transmission

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1 facilities; preparation of environmental reports; and monitoring, permitting, and
2 licensing. Since its founding in 1942, some of the milestones that the firm has
3 achieved include the following:

- 4 • Providing independent engineering and feasibility assessments
5 associated with more than \$150 billion in capital investment.
- 6 • Performance of due diligence reviews and/or design and
7 engineering of more than 400 power-related projects.

8

9 **Q. Please state your educational background and experience.**

10 A. I received a Bachelor of Science degree in Business Administration with a
11 concentration in Finance from the University of Central Florida.

12

13 Since joining R. W. Beck in 2000, I have provided a wide range of consulting
14 services, including quantitative risk assessments, wholesale power market
15 studies, wholesale power cost projections, and financial analyses. I have also
16 provided analytical support in legal and regulatory proceedings, including new
17 generating resource need determination filings, and have been involved in the
18 preparation of annual engineering reports.

19

20 Prior to joining R. W. Beck, I worked for one year as a financial analyst in the
21 Combustion Turbine Engineering Department of Siemens Westinghouse Power
22 Corporation.

23

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

2 A. The purpose of my testimony is to discuss the preliminary analysis of the ARP's
3 historical carbon footprint for the years 1990 and 2000. In doing so I will
4 discuss the methodology used to determine the ARP's carbon footprint. I will
5 also discuss the current status of greenhouse gas regulation in the State of
6 Florida.

7
8 **Q. Are you sponsoring any sections of Exhibits to your testimony?**

9 A. Yes. Exhibit No. ___ [JLW-1] is a copy of my resume.
10

11 **Q. Are you sponsoring any sections of Exhibit No. ___[FMPA-1], the Cane
12 Island Unit 4 Need for Power Application?**

13 A. Yes. I am sponsoring Section 18.2, which was prepared by me.
14

15 **Q. Please provide a summary of the current status of greenhouse gas emission
16 regulation in Florida.**

17 A. Greenhouse gas emissions currently are not regulated in Florida. On July 13,
18 2007, however, Governor Crist issued Executive Order Number 07-127, entitled
19 "Immediate Action to Reduce Greenhouse Gas Emissions within Florida."
20 Among other things, the order directed the Florida Department of
21 Environmental Protection (DEP) to adopt rules requiring carbon dioxide (CO₂)
22 emission reductions from electric utilities. As of the date of this filing, DEP has
23 not adopted any such regulations.
24

1 **Q. What are the CO₂ reduction targets set forth in Executive Order 07-127?**

2 A. The Executive Order contemplates reductions of utility CO₂ emissions to 2000
3 levels by 2017, to 1990 levels by 2025, and to levels 80 percent lower than 1990
4 levels by 2050.

5

6 **Q. Have you assessed the ARP's CO₂ emissions for the 1990 and 2000 baselines
7 contemplated in Executive Order 07-127?**

8 A. Yes. I calculated the historical CO₂ emissions for 1990 and 2000 for all 15
9 current ARP Members, regardless of the date each Member joined the ARP.

10

11 **Q. What guidelines did you use to measure these historical CO₂ emissions?**

12 A. Because DEP has not adopted guidelines for the reporting of greenhouse gases
13 as of the date of this filing, the emissions inventory was performed using the
14 guidelines set forth in the United States Department of Energy's (US DOE) final
15 "Technical Guidelines Voluntary Reporting of Greenhouse Gases (1605(b))
16 Program" (Technical Guidelines or 1605(b) Guidelines), issued in January 2007.

17

18 **Q. How do the 1605(b) Guidelines categorize emissions for electric utilities?**

19 A. The 1605(b) Guidelines categorize emissions for electric utilities as occurring
20 from either direct or indirect sources. Direct emissions are those emissions that
21 the utility is directly responsible for producing; that is, the utility produces these
22 emissions through operation of its own generating units. Indirect emissions are
23 those emissions associated with purchased power.

24

1 **Q. How does purchased power factor into carbon emission measurements?**

2 A. To the extent the utility purchases energy from a specific generating resource,
3 the emissions quantities can often be measured using the approach described for
4 computing direct emissions. For other purchases, the 1605(b) Guidelines
5 indicate that the purchasing utility should apply an EIA-provided regional
6 emissions factor to the quantity of energy purchased to estimate the CO₂
7 emissions associated with the purchase(s).

8

9 **Q. How were historical CO₂ emissions measured for FMPPA?**

10 A. In inventorying historical emissions quantities for the ARP Members, data
11 availability was the key driver of the methodology chosen. Because the 1605(b)
12 Guidelines identify continuous emissions monitoring system (CEMS) data as the
13 most accurate source of emissions quantities, CEMS data was utilized wherever
14 possible.

15

16 **Q. Was it possible to capture all of the ARP's emissions data for the years 1990
17 and 2000 using CEMS data?**

18 A. No. Because CEMS were not required to be installed on plants until after 1990,
19 this data was not available for the 1990 computation. Additionally, some small
20 generating units are not required to file CEMS data with the US EPA, so this
21 data was not available for all generators for 2000. The CO₂ emissions
22 associated with generating units for which CEMS data was not available were
23 estimated using emissions factors specific to the appropriate fuel types.

24

1 Q. **What is the ARP's resulting carbon footprint for the years 1990 and 2000**
2 **using the methodology you've described?**

3 A. The ARP's total CO₂ emissions for 1990 and 2000 were approximately 3.48
4 million tons and 4.71 million tons, respectively.

5

6 Q. **What steps is FMPA taking to reduce its carbon dioxide emissions?**

7 A. Mr. Nicholas Guarriello discusses those efforts in his pre-filed testimony.

8

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

10 A. **Yes.**

Jason Wolfe

University of Central Florida
B.S. in Business Administration
(concentration in finance)
Minor in Political Science

Mr. Wolfe is a Senior Analyst with R. W. Beck, Inc. Since joining the company in 2000, he has provided a wide range of consulting services, including quantitative risk assessments, wholesale power market studies, wholesale power cost projections, and financial analyses. Additionally, he has provided support in the development of annual engineering reports and in legal and regulatory proceedings.

Prior to joining R. W. Beck, Mr. Wolfe worked for one year as a financial analyst in the Combustion Turbine Engineering Department of Siemens Westinghouse Power Corporation.

Relevant Expertise

Risk Management and Risk Analysis

Mr. Wolfe has participated in several quantitative risk analysis and portfolio evaluation studies for clients throughout the United States. These studies have generally involved the evaluation of various power supply alternatives.

Mr. Wolfe participated in a project for CPS Energy that included a quantitative risk analysis process to evaluate power supply decisions including potential participation in future nuclear units, and other power supply technology options that included pulverized coal units, integrated coal gasification combined-cycle (IGCC) and combined-cycle (CC) gas turbines plants. The quantitative risk analysis involved projections of annual bus bar costs for each generation alternative considered (nuclear, coal, IGCC, and CC) and projections of total revenue requirements under alternative generation plans and associated "risk profiles".

Mr. Wolfe provided analytical assistance for an assessment of the estimated relative risks facing Florida Municipal Power Agency (FMPA) with respect to three potential power supply alternatives. The portfolio evaluation and risk analysis characterized and quantified the relative market risks between FMPA's base case power supply portfolio and two alternative power supply portfolios. The analysis was focused on assessing market price risks (e.g., risks from market price volatility, fuel price volatility, load volume risk, etc.). The risk analysis provided additional insight to the robustness of various expansion plans with respect to changes in fundamental market conditions.

Mr. Wolfe assisted in the development of custom risk analysis tools and methods for Seminole Electric Cooperative to enhance their power supply planning process. The work was initially performed to help Seminole consider two base load power supply options. The risk tools develop projections of Seminole's total Member power costs and associated confidence intervals under various power supply alternatives. The models were designed to be used by the Seminole staff for future power supply analysis.

KEY EXPERTISE

- > Risk Management and Risk Analysis
- > Regulatory Filing Support
- > Litigation Support Services
- > Wholesale Power Market Studies
- > Wholesale Power Cost Projections
- > Financial Planning and Analysis
- > Engineering Reports

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Regulatory Filing Support

Mr. Wolfe has developed or provided analytical support for several state or territory regulatory filings. Mr. Wolfe has provided support in the preparation of exhibits and supporting work papers for new generating resource need determination filings. Mr. Wolfe managed the development of FMPA's Ten-Year Site Plan for two years. Mr. Wolfe also assisted the Virgin Islands Water and Power Authority with several filings to the Virgin Islands Public Services Commission of the Authority's Levelized Energy Adjustment Clause.

Litigation Support Services

Mr. Wolfe has provided analytical support for several legal cases prosecuted before various state commissions and FERC. He has provided support in the preparation of exhibits and supporting work papers and assisted with discovery requests and interrogatories. These analyses have included studies on the historical operating performance of and forecasted annual decommissioning expenses for nuclear power plants, as well as the review of historical zonal and nodal LMP data in the northeastern United States.

Wholesale Power Market Studies

Mr. Wolfe has participated in deregulated wholesale power market studies throughout the Eastern Interconnect to develop regional and zonal market price projections for utilities, developers, lending institutions, and end-use customers. Mr. Wolfe has developed analyses to support the development of testimony relating to these studies and was involved in the largest merchant project financing to date in North America.

Mr. Wolfe has developed comprehensive dispatch simulation models that span multiple NERC regions and incorporate detailed information regarding generating resource operating characteristics and transmission interconnections and constraints. Mr. Wolfe has performed extensive research on new generating projects throughout much of the eastern United States and has developed spreadsheet tools to assist with modeling generating resource expansion planning.

Wholesale Power Cost Projections

Mr. Wolfe has performed projections of future wholesale electric power costs for joint action agencies and other clients in the southeastern United States. For the FMPA, Mr. Wolfe has developed models to project both short-term and long-term costs and rates. For example, FMPA's Total Cost Model (TCM) integrates output from production simulation models with other cost projections and forecasted demand and energy requirements to produce 20-year projections of FMPA's total revenue requirements and average rates to Members. FMPA utilizes the TCM for many purposes, including the evaluation of future power supply alternatives.

Financial Planning and Analysis

Mr. Wolfe has provided analytical support for new money bond financings, bond refundings, arbitrage rebate requirement compliance analyses, economic feasibility studies, and risk analyses. For example, Mr. Wolfe was involved in the preparation of Initial Project Feasibility Studies for American Municipal Power-Ohio (AMP-Ohio) related to AMP-Ohio's proposed 960 MW, coal-fired, American Municipal Power Generating Station (AMPGS), and 23.26 percent undivided ownership interest in the 1,584 MW, coal-fired, Prairie State Energy Campus. The purpose of the Project Feasibility Studies was to (1)

address the technical, operational, and financial implications and risks of the Project, and (2) provide a comprehensive examination of the Project.

Engineering Reports

Mr. Wolfe has been involved in the preparation of annual engineering reports for municipal joint-action agencies and municipal utility systems as required by the bond resolutions of the agency or utility. These reports have included discussions regarding operation and management issues, sufficiency of rates, and requirements for future bulk power supply.

Specialized Software Knowledge

EPRI Energy Book System

Ventyx Market Power

Ventyx PROMOD

Ventyx Strategist

Oracle Crystal Ball

1 BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
2 DIRECT TESTIMONY OF NICHOLAS P. GUARRIELLO
3 ON BEHALF OF
4 FLORIDA MUNICIPAL POWER AGENCY
5 DOCKET NO. _____
6 MAY 7, 2008
7

8 **Q. Please state your name and business address.**

9 A. My name is Nicholas P. Guarriello. My business address is 1000 Legion Place,
10 Suite 1100, Orlando, Florida 32801.
11

12 **Q. By whom are you employed and in what capacity?**

13 A. I am employed by R.W. Beck. My current position is Principal and Immediate
14 Past President/CEO.
15

16 **Q. Please describe R.W. Beck.**

17 A. R.W. Beck is a national management consulting and engineering firm with a
18 multidisciplined staff of 550 with 26 offices in North America and one in
19 Singapore. R.W. Beck provides a variety of consulting and engineering services
20 across several industries, including energy, water, and solid waste. For the
21 energy industry, R.W. Beck provides power supply analysis, assistance with
22 requests for proposals (RFPs); independent engineering reviews and financial
23 feasibility assessments; appraisal evaluations; due diligence reviews;

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1 transmission and distribution design services; construction management;
2 planning and owner's engineering services for generation and transmission
3 facilities; preparation of environmental reports; and monitoring, permitting, and
4 licensing. Since its founding in 1942, some of the milestones that the firm has
5 achieved include the following:

- 6 • Providing independent engineering and feasibility assessments
7 associated with more than \$150 billion in capital investment.
- 8 • Performance of due diligence reviews and/or design and engineering of
9 more than 400 power-related projects.

10

11 **Q. Please state your educational background and experience.**

12 A. I received a Bachelor of Science degree in Electrical Engineering from the
13 Polytechnic University. I have a Master of Business Administration from New
14 York University. I am also a registered Professional Engineer in the State of
15 Florida.

16

17 I have more than 35 years of experience in the electric, gas, solid waste, water,
18 and wastewater industries. My experience includes financings, appraisals, retail
19 rate studies, wholesale rate work, power supply planning, load forecasting,
20 consulting engineer's reports for bond financing, contract analyses and
21 negotiations, annual and biennial reports required by bond resolutions, and
22 expert testimony and litigation support.

23

1 I also have significant experience in strategic and long-term planning for electric
2 utility clients. I have been involved in several internal task forces and external
3 presentations addressing the competitive and restructuring issues facing the
4 utility industry in the United States, including transmission access, deregulation,
5 technological improvements, and retail wheeling.

6

7 I have been involved in providing expert assistance or testimony regarding open
8 access transmission filings in light of a changing utility environment and
9 increased competition and in need determination proceedings.

10

11 **Q. Have you worked for Florida Municipal Power Agency (FMPA) as a**
12 **consultant before?**

13 A. I have worked as a consultant to FMPA since FMPA's founding in 1978.

14

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

16 A. The purpose of my testimony is to discuss FMPA's recent request for proposals
17 (RFP) related to purchase power, renewable energy, and demand-side
18 management (DSM). I will also discuss FMPA's ongoing efforts to 1) utilize
19 renewable generation; 2) potentially participate in future nuclear generating
20 units; and 3) reduce CO₂ emissions.

21

22 **Q. Are you sponsoring any sections of Exhibits to your testimony?**

23 A. Yes. Exhibit No. ___ [NPG-1] is a copy of my resume.

1 Q. Are you sponsoring any sections of Exhibit No. ___[FMMPA-1], the Cane
2 Island Unit 4 Need for Power Application?

3 A. Yes. I am sponsoring Sections 15.0, 16.0 (except for Section 16.3), 17.2, 18.0
4 (except for Section 18.2), 19.4 and Appendices A, B, and D to Exhibit No.
5 ___(FMMPA-1), all of which were prepared under my direct supervision.
6

7 Q. Please summarize FMMPA's RFP efforts.

8 A. In an effort to identify real projects to lower FMMPA's cost and to improve
9 FMMPA's environmental performance, FMMPA initiated four separate RFP's to
10 evaluate purchase power alternatives to Cane Island 4, renewable energy
11 resources (including a Solar RFP specifically for solar photovoltaic capacity and
12 energy referred to as the solar RFP and discussed in the testimony of Mr. Tom
13 Reedy), and demand-side management resources. Through the purchase power
14 RFP, the renewables RFP, the Solar RFP, and the DSM RFP, FMMPA sought to
15 identify various potential alternatives to the addition of Cane Island 4. Although
16 none of the four RFP's identified alternatives that could delay or replace Cane
17 Island 4, they did result in projects which FMMPA is pursuing. The status of the
18 various RFP processes is summarized as follows:

- 19 • No purchase power alternatives to Cane Island 4 were submitted under the
20 purchase power RFP;
- 21 • FMMPA is continuing to negotiate potential purchase power agreements for
22 capacity and energy from a new biomass and solar photovoltaic resources
23 from both the renewables and Solar RFPs;

- 1 • FMPA is continuing to negotiate contracts with two DSM providers that
2 could result in a reduction of the ARP's coincident peak demand by as
3 much as 44 MW by 2016; and
- 4 • FMPA is also continuing to negotiate a contract with an Energy Service
5 Company (ESCO).

6

7 Through the RFP processes described above and elaborated upon further in my
8 testimony, FMPA has performed a thorough evaluation of reasonably available
9 purchase power, renewable, and demand-side management alternatives to
10 construction of Cane Island 4 in 2011.

11

12 **Q. Does the FMPA currently use purchase power agreements to satisfy the**
13 **ARP's generation requirements?**

14 A. Yes. As discussed in the testimony of Mr. Tom Reedy, several purchase power
15 agreements are in place with various entities including Progress Energy Florida
16 (PEF), Florida Power & Light (FPL), Calpine, and Southern Power Company.

17

18 **Q. Were any of these purchase power agreements a result of previous RFP**
19 **processes?**

20 A. Yes. The Calpine and Southern Power Company purchase power agreements
21 were the result of previous RFP processes.

22 **Q. Did FMPA make any efforts to extend existing purchase agreements that**
23 **may expire during the evaluation period considered in this Application?**

24 A. Yes. Mr. Tom Reedy discusses those efforts in his pre-filed testimony.

1 **Q. Please describe FMPA's recent purchase power RFP.**

2 A. The RFP served as an invitation for qualified companies to submit proposals for
3 the supply of capacity and energy to meet a portion of the projected power
4 requirements of the ARP beginning on January 1, 2011 and continuing over a
5 period of at least 10 years. The RFP requested a minimum of 50 MW (up to a
6 maximum of 300 MW) and required that the proposed capacity and energy be
7 delivered to the PEF transmission system.

8

9 **Q. How did FMPA notify potential bidders of the purchase power RFP?**

10 A. The power supply RFP was distributed directly to 14 utilities and independent
11 power producers (IPPs). Additionally, the RFP was posted on FMPA's website
12 which allowed industry publications to pick it up for further distribution.

13

14 **Q. What was the overall response to the RFP?**

15 A. One of the requirements set forth in the power supply RFP was mandatory
16 attendance at the pre-bid conference prior to submitting a response to the RFP.
17 No potential bidders attended the pre-bid conference, nor did any entities submit
18 notices of intent to bid, which were required (as stated in the RFP) to be
19 submitted no later than July 3, 2007. The schedule set forth in the power supply
20 RFP required that all bids in response to the RFP be submitted by August 17,
21 2007. No bidders responded to the power supply RFP, and therefore the power
22 supply RFP process was terminated on November 5, 2007.

23

1 **Q. Why do you believe FMPA did not receive any bids for the power supply**
2 **RFP?**

3 A. I do not have any direct knowledge of why individual entities decided not to bid.
4 However, there are several potential reasons. First, Cane Island Unit 4 will be
5 located at an existing site utilizing existing infrastructure. Second, FMPA's low
6 cost of financing through the use of tax exempt municipal bonds results in lower
7 cost power. Third, FMPA's ability to exercise an existing option to purchase the
8 combustion turbine below the current market price makes FMPA's Cane
9 Island 4 very economical. Finally, the current condition of the power market in
10 the state of Florida is very tight.

11

12 **Q. Does FMPA currently have any renewable capacity?**

13 A. Yes. FMPA currently receives renewable energy from two sources. The first is
14 as-available energy from a cogeneration plant fueled with bagasse owned by US
15 Sugar Corporation. The second is landfill gas (LFG) from the Orange County
16 Landfill that is burned as a supplemental fuel source in Stanton 1 and 2, coal
17 fired units of which FMPA is a joint owner.

18

19 **Q. Please discuss FMPA's Renewable RFP.**

20 A. FMPA issued its Renewables RFP on June 29, 2007. The Renewables RFP
21 served as an invitation for qualified companies to submit proposals for the
22 supply of capacity and energy to meet a portion of the projected power
23 requirements of the ARP beginning on January 1, 2011 or earlier and continuing

1 over a period of at least 5 years. The RFP requested a minimum of 1.0 MW
2 with no upper limit on capacity and required that the proposed capacity and
3 energy be delivered to either the FPL or PEF transmission systems.
4

5 **Q. How did FMPA notify potential bidders of the Renewables RFP?**

6 A. The Renewables RFP was distributed directly to 26 entities and notification of
7 the RFP was posted in two industry publications. Additionally, the RFP was
8 posted on FMPA's website which allowed industry publications to pick it up for
9 further distribution.
10

11 **Q. Did the Renewables RFP include a preference for the type of renewable
12 energy resources proposed?**

13 A. No, the RFP was open to any renewable technology. The Renewables RFP
14 requested resources where the sole source of fuel used for the production of
15 energy for sale to FMPA was from one or more of the following sources of
16 renewable energy defined in 377.803(6) F.S.: hydrogen produced from sources
17 other than fossil fuels; biomass; solar energy; geothermal energy; wind energy;
18 ocean energy; hydroelectric power; waste heat from a commercial or industrial
19 process; or any other technologies utilizing fuel/energy sources deemed by
20 FMPA to be renewable in nature.
21

1 **Q. How many bids did FMPA receive in response to the Renewables RFP?**

2 A. FMPA received three bids. The three bids included a 58 MW summer rated
3 biomass circulating fluidized bed (CFB) plant proposed that would burn waste
4 wood and other materials including recycled pallets and paper derived fuel; 10
5 MW of roof-mounted solar photovoltaic (PV) systems; and a 1 MW to 3 MW
6 centralized PV system.

7

8 **Q. Please describe how these proposals were evaluated.**

9 A. The first phase of the evaluation involved a screening of bids received with the
10 minimum requirements as described in Section 20 of the Renewables RFP. This
11 evaluation, which was completed on September 12, 2007, indicated that two (2)
12 of the proposals had not clearly met certain of the minimum requirements.
13 Questions were submitted to these two proposers to obtain additional
14 information. At this point, FMPA decided to continue to consider all three of
15 the proposals received.

16

17 A preliminary quantitative evaluation was completed for all three proposals on
18 October 19, 2007. Based on the preliminary evaluation, FMPA short listed all
19 three proposers and meetings were held with the proposers on October 31
20 through November 2, 2007. After the meetings a second set of questions were
21 submitted to the proposers. Responses to the questions were received between
22 November 14, 2007 and November 27, 2007. The centralized PV proposer

1 indicated that it could not support the original price offered and provided a
2 higher priced verbal offer. After the second set of responses to questions was
3 received, the evaluations were updated.

4
5 **Q. What were the results of these evaluations?**

6 A. The evaluations indicated that the levelized busbar costs for the three renewable
7 alternatives were projected to be above FMPA's avoided cost. The biomass
8 proposal was projected to be the lowest cost of the three proposals on a dollar
9 per MWh basis.

10

11 Nevertheless, in spite of their higher costs, FMPA decided to continue
12 negotiations with two of the proposers as part of its commitment to renewable
13 resources. As of the time of the updated evaluation the bidder proposing the
14 centralized PV system did not supply the required proposal security. As a result,
15 no further meetings were held with this proposer.

16

17 **Q. What were the results of these continued negotiations?**

18 A. As a result of further negotiations, the rooftop PV proposer offered reduced
19 pricing which was still above FMPA's avoided cost. FMPA is continuing
20 negotiations with the rooftop PV proposer for an open-ended contract for up to
21 10 MW at FMPA's discretion. The proposer has agreed to continue discussions
22 on this basis.

23

1 Negotiations with the biomass proposer have continued over the course of three
2 additional meetings during March and April 2008. FMPA has explored different
3 pricing arrangements over the course of the negotiations.

4
5 **Q. Is FMPA moving forward with either of these proposals for renewable**
6 **energy?**

7 A. Yes. FMPA's ARP Executive Committee has approved continued negotiations
8 for a power purchase from the biomass facility. Because the cost of biomass
9 energy is higher than FMPA's avoided cost, before entering into a final contract
10 with the proposer, FMPA will need to assess the cost penalty associated with the
11 project. Furthermore, FMPA's ultimate commitment to utilizing biomass
12 energy to serve its energy requirements will depend on whether biomass
13 continues to be considered a renewable and carbon neutral energy source in
14 Florida. FMPA will also need to examine the actions of other utilities in Florida
15 in meeting their renewable targets to ensure that FMPA's rates remain cost
16 competitive. The time frame for implementation of a biomass resource would
17 depend on the time necessary to complete negotiations and obtain all required
18 regulatory approvals and permits and approval of mutually agreeable
19 commercial terms by FMPA.

20

21 The ARP Executive Committee also has approved continued negotiations for an
22 open ended power purchase of up to 10 MW at FMPA's discretion from the
23 roof-mounted PV systems bidder. While the cost of this alternative appears to

1 be higher on a \$/MWh basis than the least cost solar PV bid discussed in the
2 testimony of Mr. Tom Reedy, there may be special circumstances for which
3 roof-mounted PV systems would be desirable. Again, FMPA will need to assess
4 the cost penalty associated with the project and negotiate mutually agreeable
5 commercial terms.

6

7 **Q. Is FMPA considering other renewable opportunities?**

8 A. Yes. FMPA is exploring several other renewable opportunities which include
9 the following. FMPA is investigating the use of bio-fuels in several of its
10 generating units. FMPA plans to conduct initial trials of the bio-fuel in Stock
11 Island Units 1-3 which are combustion turbines that currently operate only on
12 No. 2 oil. FMPA is working with a developer who is attempting to develop a
13 large 15 MW LFG project. FMPA is working with Geoplasma, LLC, a
14 developer which is attempting to develop a plasma arc project that would
15 convert solid waste from the St. Lucie County landfill into syngas. FMPA has
16 signed a letter of intent with Geoplasma, LLC, to explore the feasibility of the
17 technology and development of the project. More detailed discussion of these
18 additional renewable alternatives is presented in Section 16.4 of the Need for
19 Power Application Exhibit ---(FMPA-1).

20

21 **Q. Why did FMPA issue a DSM RFP?**

22 A. As discussed in the testimony of Thomas Reedy, it is difficult for FMPA as a
23 wholesale power provider to directly provide conservation and DSM programs

1 to retail customers. Through a DSM RFP, FMPA was looking for innovative
2 ways in which private industry could provide conservation and DSM programs
3 directly to ARP member retail customers.

4

5 **Q. Please discuss FMPA's DSM RFP.**

6 A. On July 27, 2007, FMPA issued its DSM RFP. The DSM RFP served as an
7 invitation for qualified companies to submit proposals for DSM resources.
8 DSM resources include any facility, program, or service implemented for retail
9 customers that serves to permanently reduce or shift the time of consumption of
10 electric energy and/or electric demand. The RFP requested a minimum contract
11 term of one-year beginning no earlier than June 1, 2008. On-peak demand
12 reductions must be at least 1,000 kW for third party proposers, and 500 kW for
13 customer proposers.

14

15 **Q. How did FMPA notify potential bidders of the DSM RFP?**

16 A. The DSM RFP was distributed directly to thirty five (35) DSM providers and
17 notification of the RFP was posted in one industry publication. Additionally, the
18 RFP was posted on FMPA's website which allowed industry publications to
19 pick it up for further distribution.

20 **Q. How many bids did FMPA receive in response to the DSM RFP?**

21 A. Four (4) proposals were received by the September 26, 2007 due date specified
22 in the DSM RFP. Of the proposals received, three offered programs to reduce

1 FMPA's capacity or energy requirements – two using demand-response and the
2 third through an energy services company or "ESCO" arrangement. The fourth
3 proposal was an offer to provide computer software and equipment, which was
4 not the type of proposal being sought by FMPA.

5
6 **Q. Please describe the two demand response proposals and the ESCO proposal**
7 **received in response to the DSM RFP.**

8 A. The first demand response type proposal was projected to reduce the ARP's
9 peak demand by 20 MW - 35 MW over a 5-year period. FMPA would pay a
10 contractual rate for demand and energy reductions. The bidder would monitor
11 FMPA's load from its 24 hour centralized control center and would curtail load
12 when notified by FMPA. The bidder would bear the cost associated with
13 monitoring and equipment installations. The bidder would guarantee MW
14 reductions and would pay FMPA penalties for failure to deliver. Reductions
15 would be measured against average kW usage during peak periods over the three
16 highest usage days of the last 10 days.

17
18 The second demand response bidder's current offer is up to 44 MW of demand
19 reduction over an 8-year period. The bidder would curtail load when notified by
20 FMPA. The curtailment would be measured against the average of the
21 participating facilities' single highest hourly demands for each of the four
22 summer months of the previous year. The payment to the customer for the
23 curtailment would be based on the average curtailment for all hours of the

1 events occurring during the month. The bidder would guarantee MW reductions
2 and would pay FMPA penalties for failure to deliver. FMPA would be
3 responsible for metering costs for each participating customer.

4
5 The proposed ESCO arrangement would set up an ESCO that would work
6 directly with ARP members' customers such as schools, colleges, and large
7 commercial and industrial customers to reduce energy usage by changing
8 equipment, sequence of operation, or run times to reduce a customer's energy
9 use. The customers would pay to get guaranteed energy reduction that would be
10 guaranteed by the proposer.

11

12 **Q. Please describe how these proposals were evaluated.**

13 A. On October 26, 2007, lists of clarifying questions were submitted to the three
14 qualified proposers described previously. Responses to the questions were
15 received over the period November 3, 2007 through November 20, 2007. Based
16 on these responses an evaluation of the DSM proposals was prepared on
17 December 3, 2007. The evaluation compared pricing for each of the definitive
18 proposals against the cost of conventional capacity.

19

20 **Q. What were the results of these evaluations?**

21 A. This evaluation concluded that both of the demand response proposals offered
22 definitive proposals for demand response programs that were projected to reduce
23 FMPA's demand. The pricing for one of the demand response proposals was

1 clearly lower than the other and could potentially reduce FMPA's demand
2 related costs compared to supply-side alternatives. The third proposal, the
3 ESCO, did not provide a specific energy reduction or pricing after clarifying
4 questions had been asked except to project that participating customers could
5 reduce their energy consumption by 15 percent to 20 percent. None of the
6 proposals offered definitive energy efficiency or conservation programs.

7
8 Based on the initial evaluation of the DSM proposals, FMPA decided to meet
9 with the three qualified DSM proposers to further clarify DSM programs that
10 could reduce FMPA's costs and help meet FMPA's goals to reduce greenhouse
11 gas emissions. FMPA met with all of the proposers in January 2008 and has
12 followed up with all of them with further meetings and/or phone calls. FMPA
13 continued to negotiate agreements with all three proposers.

14
15 **Q. What were the results of these continued negotiations?**

16 **A.** Following initial negotiations between FMPA and the DSM proposers, both of
17 the demand response proposers were approved by the ARP Executive
18 Committee for further negotiations. FMPA is continuing negotiations with both
19 demand response proposers. In addition, FMPA is continuing discussions with
20 the ESCO proposer relating to their energy efficiency/conservation type
21 proposal.

22

1 **Q. Is FMPA moving forward with either of the demand response proposals?**

2 A. Yes. Based on responses to the DSM RFP and subsequent discussions with the
3 demand response proposers, FMPA is examining the possibility of
4 implementing a demand response program that could potentially reduce the ARP
5 coincident peak demand by up to approximately 44 MW by 2016, with the
6 following assumed implementation schedule based on the information provided
7 by one of the proposers:

- 8 • 15 MW in 2009
- 9 • 7 MW in 2010 (22 MW cumulative)
- 10 • 4 MW in 2011 (26 MW cumulative)
- 11 • 4 MW in 2012 (30 MW cumulative)
- 12 • 4 MW in 2013 (34 MW cumulative)
- 13 • 4 MW in 2014 (38 MW cumulative)
- 14 • 4 MW in 2015 (42 MW cumulative)
- 15 • 2 MW in 2016 (44 MW cumulative)

16
17 **Q. Is FMPA pursuing any other conservation and DSM initiatives?**

18 A. Yes. These initiatives are discussed in the prefiled testimony of Thomas Reedy,
19 and Section 17.3 of Exhibit No. __ (FMPA-1).

20 **Q. Has FMPA undertaken any actions that have reduced the ARP's carbon
21 footprint?**

22 A. Yes. Historically, FMPA has sought to improve the efficiency of its generating
23 fleet, which has had the added benefit of reducing carbon intensity (quantity of

1 CO₂ per unit of energy produced). These activities have involved installation of
2 new efficient natural gas combined cycle generating units which allowed the
3 retirement and displacement of older inefficient oil and gas units. In addition,
4 these efficient natural gas combined cycle generating units also allowed for the
5 replacement of higher emitting purchase power contracts. These efficient
6 natural gas combined cycle units include the existing Cane Island Units 2 and 3,
7 Stanton A, as well as the Treasure Coast Energy Center scheduled for
8 commercial operation in May of 2008. In addition to installing efficient
9 combined cycle generation units, FMPA has also entered into unit specific
10 purchase power arrangements which provide power from efficient natural gas
11 fueled combined cycle resources. Examples of these purchases include the
12 portion of Stanton A that is purchased from Southern Company and Calpine –
13 Osprey. When simple cycle capacity was required, FMPA constructed a
14 LM6000 combustion turbine at Stock Island which is the most efficient
15 combustion turbine of its size. FMPA also recently entered into a purchase
16 power contract from Southern Company's Oleander site which utilizes the
17 efficient General Electric 7FA combustion turbines.

18
19 Other historical carbon reduction activities include the U.S. Sugar and Stanton
20 Landfill gas renewable projects discussed earlier as well as existing conservation
21 and DSM programs discussed in the prefiled testimony of Thomas Reedy.

22

1 **Q. Is FMPA pursuing any additional activities that will further reduce CO₂**
2 **emissions?**

3 A. Yes. Cane Island 4 will allow further retirement and displacement of inefficient
4 generation, which will reduce FMPA's total CO₂ emissions. Upgrades to the
5 Crystal River 3 and St. Lucie 2 nuclear units for which ARP or its members are
6 joint owners will increase the capacity of these units which emit zero CO₂. This
7 increase in ARP's nuclear capacity will further reduce the ARP's total CO₂
8 emissions. In the longer term, FMPA is pursuing participation in the Progress
9 Energy Florida's Levy County units 1 and 2 and FPL's Turkey Point units 6 and
10 7 nuclear units. Successful implementation of the potential biomass and
11 photovoltaic projects discussed earlier also would reduce FMPA's CO₂
12 emissions. Continued existing and future new conservation and DSM programs
13 will also reduce FMPA's CO₂ emissions. Details of FMPA's carbon reduction
14 activities are presented in Section 18.0 of the Need for Power Application.
15 Exhibit No. ____ (FMPA-1)

16
17 **Q. How do FMPA's projected CO₂ emissions compare to the 2017 goal in**
18 **Executive Order 07-127?**

19 A. FMPA's preliminary analyses indicate that the least cost expansion plan with
20 Cane Island Unit 4 would enable FMPA to achieve the 2017 CO₂ emission
21 target level in Executive Order 07-127.

22

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

2 A. Yes.

Nicholas P. Guarriello, P.E.

New York University
Master of Business Administration

Polytechnic University
B.S. in Electrical Engineering
Registered Professional Engineer

Mr. Guarriello joined R. W. Beck in 1977 and is currently serving as Principal and Immediate Past President/CEO. From 1998 through November 1, 2005, Mr. Guarriello was the Firm's President and CEO. Since joining the Firm, he has served as Project Manager or Principal-in-Charge for numerous projects involving electric, gas, solid waste, water, and wastewater utility systems. His experience includes: litigation support and expert testimony; financings; appraisals; retail rate studies; wholesale rate work; power supply planning; consulting engineer's reports for bond financing; contract analyses and negotiations including those related to joint ownership agreements; and annual and biennial reports required by bond resolutions. Mr. Guarriello has also directed or participated in providing a wide range of consulting services to several large joint action agencies.

Mr. Guarriello has had significant experience in strategic and long-term planning for his electric utility clients. He has been involved in several internal task forces and external presentations addressing the competitive and restructuring issues facing the utility industry in the United States including transmission access, deregulation, technological improvements, and retail wheeling.

Mr. Guarriello has been involved in providing expert assistance or testimony regarding open access transmission filings in light of a changing utility environment and increased competition.

On behalf of a 29 member joint action agency in Florida, he assisted in the filing and negotiations regarding the agency's request for network transmission service under Sections 211 and 212 of the Federal Power Act. Mr. Guarriello participated in the development of the rates, terms, and conditions for network transmission filed before FERC. This project represented the first ever approval of network transmission under Section 211 by FERC.

In addition, he has made several presentations regarding the renewed interest in coal generation and the future of the electric power industry. He stays abreast on utility trends impacting the industry, and over the years, has spoken at several executive forums.

Relevant Expertise

Contract Analyses and Negotiations

- Joint Ownership Agreements
- Energy Purchase and Sales Agreements
- Transmission Arrangements
- Contract Arbitration

KEY EXPERTISE

- > Contract Analyses and Negotiations
- > Power Supply Planning
- > Financings
- > Expert Testimony and Litigation Support
- > Joint Action Agencies
- > Retail Rate Studies
- > Annual and Biennial Reports
- > Independent Power Producers and Cogeneration
- > Appraisals
- > Environmental

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Mr. Guarriello has extensive experience in negotiating and evaluating energy purchase and sales agreements involving nuclear, coal, oil, gas, waste-to-energy and cogeneration projects. He has also been involved with developing transmission and interconnection arrangements for electric systems and qualifying facilities. Clients for whom he has negotiated contracts and settlements include the Florida Municipal Power Agency, the East Florida Municipal Group, Fort Pierce Utilities Authority, the Utility Board of the City of Key West, the City of Clarksdale, Mississippi and a large private commercial improvement district. Contractual agreements have involved short and long term power arrangements, contracts associated with the operation of jointly-owned generating facilities, wholesale power agreements and contracts dealing with unit power purchases.

Prior to joining R. W. Beck, Mr. Guarriello's experience included the negotiation and administration of special contracts associated with the operation of jointly owned generating facilities. He assisted in the preparation of testimony in rate cases and arbitration's involving these special contracts.

Power Supply Planning

- Load Forecasts
- Economic Feasibility Studies

Mr. Guarriello has directed and participated in numerous power supply studies for both municipalities and joint action agencies. Ongoing power supply studies have been provided for Florida clients including the Florida Municipal Power Agency, the Utility Board of the City of Key West, the Cities of Vero Beach and Jacksonville Beach, the Fort Pierce Utilities Authority, FMPA and a large private commercial improvement district. These studies have included load forecasting, alternative power supply resource analyses, economic and financial feasibility studies, and risk analyses. For the Utility Board of the City of Key West, Mr. Guarriello served as Project Manager for a power supply study evaluating twelve different power generation expansion alternatives. After screening down to five alternatives, the options were analyzed with regard to the amount of projected capacity deficiencies, the capacity factors at which the units would be operated, potential power purchases over time, existing resources review, sensitivity analyses, and the reliability of supply. Mr. Guarriello was also co-author for a paper on the analysis of generating reserve requirements for interconnected power systems, and participated in the development of a capacity reserve analysis program. Prior to joining R. W. Beck, Mr. Guarriello worked for a major mid-Atlantic utility in the area of bulk power supply planning. His responsibilities included the analysis of systems load, the development of long-range load forecasts, the optimization of hydro-fossil-nuclear generating capacity data for hydroelectric project license applications and proceedings, environmental impact statements and plant siting studies.

Financings

- Consulting Engineer's Reports
- Contract Documents and Bond Resolutions

Mr. Guarriello has extensive experience in the preparation of consulting engineer's reports which are included in official statements for major tax exempt revenue bond financings for utility systems. Mr. Guarriello has been involved in over \$2 billion in bond financings. He has worked with bond counsels, attorneys and underwriters on the development of bond resolutions and contract documents. Clients for whom Mr. Guarriello has provided ongoing bond financing support include the Florida Municipal Power Agency, the cities of Tallahassee, Bushnell and Jacksonville Beach, the Utility Board of the City of Key West, and the Fort Pierce Utilities Authority. Serving as Project Manager, he participated in the financings of major tax-exempt projects including the St. Lucie and Stanton projects for FMPA.

For the Fort Pierce Utilities Authority, he has been involved with financings for the electric, water, sewer and gas systems.

Expert Testimony and Litigation Support

- Wholesale Rates
- Transmission Access
- Interchange Agreements

In the past, Mr. Guarriello has submitted testimony, and testified before the Florida Public Service Commission in several proceedings relating to generic hearings on peak load pricing and declining block rates, certification of need hearings for new coal-fired units to be built in Florida, and the Commission's investigation to determine the need for an additional 500 kilovolt transmission line interconnection between Florida and the Southern Company System. He has testified in support of wholesale rates and negotiated settlements for wholesale rate cases for the Twelve Cities Public Power Committee, which were the all-requirements cities on the Florida Power Corporation System. Mr. Guarriello has also testified for the East Florida Municipal Group which includes the generating and all requirements cities of the Florida Power and Light System. He has provided litigation support with respect to transmission and interchange agreements.

Joint Action Agencies

- Annual Engineer's Reports
- Bond Financing
- Power Supply Studies
- Contractual Negotiations
- Litigation Support and Expert Testimony

Mr. Guarriello has had many years of experience providing services for joint action agencies in the Southeastern United States. He played a key role in the formation of the Florida Municipal Power Agency (FMPA) and the Municipal Energy Agency of Mississippi (MEAM), having developed, together with bond counsel, financial advisors and agency staff, the contractually complex joint action agency agreements. FMPA was created in 1978 to allow its 28 member utility systems to join together for joint financing, constructing, managing, operating, utilizing and owning projects. Mr. Guarriello has served as Project Manager and Principal-in-Charge for numerous power supply studies, bond financings, and contractual analyses and negotiations including those relating to joint ownership agreements, and litigation support services for FMPA and MEAM.

Retail Rate Studies

- Electric, Gas, Water and Sewer Systems

Mr. Guarriello has performed electric, sewer, water and gas retail rate studies for many of the Firm's Florida municipal clients. He has directed or participated in rate studies that have included revenue requirement forecasts, cost of service, user fees, impact fees, rate design and long term load forecasts. He has also directed rates studies in which cross subsidization between classes has been analyzed. As Principal-in-Charge or Project Manager he has provided rate studies for the Utility Board of the City of Key West, the Fort Pierce Utilities Authority, the cities of Homestead, Bushnell, Vero Beach, Tallahassee, and New Smyrna Beach, and a large private commercial improvement district.

For proceedings before the Florida Public Service Commission, Mr. Guarriello developed a tutorial on how municipalities in Florida develop retail rates. The tutorial outlined how rates were developed and structured.

Annual and Biennial Reports

- Operations and Maintenance Review
- Status of Operating Budget

Mr. Guarriello has served as Project Manager or Principal-in-Charge for the preparation of annual and biennial reports for over 15 years. For FMPA he oversaw the production of the Annual Engineer's Report for the St. Lucie and Stanton projects, which included a report on the status of the current annual budget and construction fund, and a report on its construction, operation and maintenance, and renewals and replacements. The project included the review of capital expenditures and operating budgets, comparing budgeted versus actual revenues and construction costs. Also for FMPA, Mr. Guarriello acted as Principal-in-Charge for the Annual Engineering Report for the Tri-City project. The participant cities included Fort Pierce Utilities Authority, the City of Homestead and the Utility Board of the City of Key West, Florida. As Project Manager for the Annual Report conducted for a large private commercial improvement district, Mr. Guarriello reviewed seven utility systems with regard to: the management of the properties; operation and maintenance; the status of the operating budget and construction fund; and the sufficiency of rates and charges for services. The improvement district's systems included the electric, water, wastewater, gas, solid waste, hot water, and chilled water systems. Mr. Guarriello has also been in charge of the Annual and Biennial reports for the Cities of Tallahassee, Bushnell and the Utilities Commission of New Smyrna Beach, and the Utility Board of the City of Key West.

Independent Power Producers and Cogeneration

- Contract Negotiations
- Bid Process Evaluation and Proposal Analysis

Mr. Guarriello has extensive experience in negotiating and evaluating contracts for cogeneration projects for municipal utilities. For the Orlando Utilities Commission he served as Project Manager, reviewing and evaluating the bid process for independent power producers (IPP's), and providing financial support in analyzing the proposals. Acting as Principal-in-Charge for services provided to the City of Tallahassee, he reviewed the economic impact on the City's electric and gas systems operations of the installation of a potential cogeneration project by one of the City's largest customers, Florida State University. The tasks for the project included describing the proposed arrangements, preparing computer generation dispatch models, preparing economic analyses and comparisons, and preparing projected operating results for both the electric and gas systems.

Appraisals

- Utility Valuation
- Economic Studies

Mr. Guarriello has reviewed appraisals of utility property, including water, wastewater and electric systems. These appraisals have involved various valuation methodologies, including discounted cash flow analyses, direct capitalization's of income, and Original Cost Less Depreciation (OCLD) and Reproduction Cost New Less Depreciation (RCNLD) studies. The results of these studies have been used to establish the fair market value of property to be sold or acquired by clients in negotiated sales or

through condemnation. He has also performed economic studies to determine the value and feasibility of proposed capital projects.

Environmental

▪ Clean Air Act Amendment

Mr. Guarriello has experience in working with our clients relating to the understanding of the Clean Air Act Amendment of 1990 and its applicability to electric utilities. Mr. Guarriello, as Principal-in-Charge, has been responsible for providing consulting services to our clients including (i) conducting seminars on the Clean Air Act of 1990 including meeting requirements for Continuous Emissions Monitoring Equipment (CEMS) for affected sources; (ii) reviewing data tabulated in the National Allowance Data Base, Version 1.0 and Version 2.0 as published by the Energy Information Administration (EIA) and preparing letters to the EIA with corrections to the data base as necessary; (iii) reviewing legislation to ensure all bonus allowances have been identified and all current options for allowances evaluated; (iv) preparing letters to EPA requesting the baseline years and corresponding fuel consumption for use in calculating the allowance allocation for each unit; (v) calculating the amount of emissions reductions that will be required by affected generating units to meet the limitations specified under the legislation; (vi) identifying options available for compliance with the legislation, such as: purchasing additional allowances, reducing the operation of affected units, obtaining allowances from other units, installing scrubbers, and using lower sulfur fuel; and (vii) investigating the possibility of electing units to be covered by the legislation which are not automatically affected (i.e. units of 25 MW or less or simple cycle combustion turbines) and evaluating the number of allowances that would be obtained.

Published Articles

"Roles of Fuels/Technology in Future US Power Demand," Published by Wiley Periodicals in *Natural Gas & Electricity*, May, 2006

"Class of 2005," Published in *World-Generation*, Dec./Jan., 2005.

"The Coal Rush," Published in *World-Generation*, Sept./Oct., 2004.

"R. W. Beck Leverages Energy Experience into Water/Wastewater Markets," Published in the *Environmental Business Journal*, Volume XIV, Number 1-2, 2002

Presentations

Coal-Based Partnerships – An Economic Overview of "The Coal Rush" at Elcon, Washington, D.C., Oct., 2006

"The Coal Rush Revisited," Presentation at *COAL-GEN 2006*, Cincinnati, Ohio, Aug., 2006

"How Electric Utilities Will Meet the Demand for Power in the U.S., Including What Role Fuels/Technology Will Play," Keynote presentation at *IPED Coal Conference*, Naples, Fla., Jan., 2006

"Vision of the Future," Keynote presentation at *RMEL Fall Conference*, Jackson, Wyo., Sept., 2005

"The Coal Rush: An Economic Overview of the Renewed Interest in the Power Industry's 'Old Stand-by,'" Presented at the *Cinergy Anniversary Conference, "Coal 2020"*, Cincinnati, Ohio, Oct., 2004

"The Coal Rush: An Economic Overview of the Renewed Interest in the Power Industry's 'Old Stand-by,'" Presented at the IPED's "New Coal-Fired Generation: A Practical Course in Joint Ownership and the Coal Market" Conference, Washington, D.C., Dec., 2004

"The Coal Rush: An Economic Overview of the Power Industry's 'Old Stand-by,'" Presented at the Aspen Summit, Aspen, Colo., July, 2004

Affiliations

Board Member of Keystone Energy

Delegate of Aspen Institute

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF BRADLEY E. KUSHNER

ON BEHALF OF

FLORIDA MUNICIPAL POWER AGENCY

DOCKET NO. _____

MAY 7, 2008

Q. Please state your name and business address.

A. My name is Bradley E. Kushner. My business mailing address is 11401 Lamar Avenue, Overland Park, Kansas 66211.

Q. By whom are you employed and in what capacity?

A. I am employed by Black & Veatch Corporation where I am currently a Manager.

Q. Please describe your responsibilities in that position.

A. I am responsible for the management of various projects for utility and non-utility clients. These projects include production cost modeling associated with power system expansion planning, feasibility studies, and demand-side management (DSM) evaluations. I also have involvement in the issuance and evaluation of requests for proposals (RFPs).

Q. Please describe Black & Veatch.

A. Black & Veatch Corporation has provided comprehensive engineering, consulting, and management services to utility, industrial, and governmental

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1 clients since 1915. Black & Veatch specializes in engineering, consulting, and
2 construction associated with utility services including electric, gas, water,
3 wastewater, telecommunications, and waste disposal. Service engagements
4 consist principally of investigations and reports, design and construction,
5 feasibility analyses, rate and financial reports, appraisals, reports on operations,
6 management studies, and general consulting services. Present engagements
7 include work throughout the United States and numerous foreign countries.
8

9 **Q. Please state your educational background and professional experience.**

10 A. I received my Bachelors of Science in Mechanical Engineering from the
11 University of Missouri – Columbia in 2000. I have more than 8 years of
12 experience in the engineering and consulting industry. I have experience in the
13 development of integrated resource plans, ten-year-site plans, demand-side
14 management plans, and other capacity planning studies for clients throughout
15 the United States. Utilities in Florida for which I have worked include Florida
16 Municipal Power Agency (FMPPA), JEA, Kissimmee Utility Authority, Orlando
17 Utilities Commission, Lakeland Electric, Reedy Creek Improvement District,
18 Tampa Electric Company (TECO), and the City of Tallahassee. I have
19 performed production cost modeling and economic analysis, and otherwise
20 participated in three previous Need for Power Applications that have been filed
21 on behalf of Florida utilities and approved by the Florida Public Service
22 Commission (FPSC). I have also testified before the FPSC in previous Need for
23 Power filings.
24

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

2 A. The purpose of my testimony is to discuss the fuel and emissions allowance
3 price forecasts and supply-side alternatives used in the economic analysis of
4 Cane Island 4. I will also discuss the methodology utilized in the analyses, as
5 well as the results of the economic evaluations that were performed for
6 numerous scenarios and sensitivities.

7
8 **Q. Have you prepared any exhibits to your testimony?**

9 A. Yes. Exhibit No. __[BEK-1] is a copy of my resume. Exhibit No. __ [BEK-2]
10 presents the Reference Case fuel price projections. Exhibit No. __ [BEK-3]
11 presents the High Price Case fuel price projections. Exhibit No. __ [BEK-4]
12 presents the Low Price Case fuel price projections. Exhibit __[BEK-5] is a
13 series of tables presenting the results of the economic evaluation of Cane
14 Island 4.

15
16 **Q. Are you sponsoring any sections of Exhibit No. __ [FMPA-1], the FMPA
17 Cane Island Power Plant 4 Need for Power Application?**

18 A. Yes. I am sponsoring Sections 7.0, 14.0, 19.0 (with the exception of 19.4), 20.0,
19 and 21.0, all of which were prepared by me or under my direct supervision.

20
21 **Q. Please describe the basis for the fuel price projections used in the Cane
22 Island 4 Need for Power Application, Exhibit No. __ [FMPA-1].**

23 A. The fuel price projections for natural gas, fuel oil, and coal used for the
24 economic evaluations presented in Exhibit No. __ [FMPA-1] were based on

1 those presented in the US Energy Information Administration's (EIA) Annual
2 Energy Outlook 2007 (AEO2007).

3
4 The AEO2007 presents projections of energy supply, demand, and prices
5 through the year 2030. The projections presented within the AEO2007 are based
6 on results from the EIA's National Energy Modeling System (NEMS). NEMS is
7 a computer-based, energy-economy modeling system of US energy markets and
8 projects the production, imports, conversion, consumption, and prices of energy,
9 subject to a variety of assumptions related to macroeconomic and financial
10 factors, world energy markets, resource availability and costs, behavioral and
11 technological choice criteria, technology characteristics, and demographics.

12
13 AEO2007 includes the Reference Case, as well as numerous other cases. For
14 purposes of the economic evaluations presented in Exhibit No. __[FMPA-1], the
15 AEO2007 High Price Case and Low Price Case were considered in addition to
16 the Reference Case.

17
18 **Q. How are state and federal legislation and regulations reflected in AEO2007?**

19 A. Analyses developed by the EIA are required to be policy neutral. Therefore, the
20 projections in the AEO2007 are based on federal and state laws and regulations
21 in effect on or before October 31, 2006 (with few exceptions). As stated in the
22 AEO2007, the potential impacts of pending or proposed legislation, regulations,
23 and standards – or of sections of legislation that have been enacted, but that

1 require implementing regulations or appropriation of funds that are not provided
2 or specified in the legislation itself – are not reflected in the projections.

3

4 **Q. Were any steps taken to consider the effects of the potential for future**
5 **regulation related to emissions of carbon dioxide (CO₂)?**

6 A. Yes. As I will discuss later in my testimony, several different cases reflecting
7 regulation of CO₂ were considered. The CO₂ and corresponding fuel price
8 projections used in these evaluations were based on projections from both the
9 EIA and the US Environmental Protection Agency (EPA) and considered two
10 separate proposals to the 110th US Congress to regulate CO₂ emissions.

11

12 **Q. Does AEO2007 provide projections of fuel prices for fuel delivered to the**
13 **Florida region?**

14 A. Yes. The AEO2007 Reference Case includes fuel price projections for delivered
15 fuel to numerous geographic areas throughout the US. The natural gas and fuel
16 oil price projections used in the economic evaluations presented in Exhibit No.
17 ___ [FMPA-1] were based on AEO2007 price projections for natural gas and fuel
18 oil delivered to the Florida Reliability Coordinating Council (FRCC). Coal
19 price projections were based on the AEO2007 price projections for coal
20 delivered to the Georgia/Florida region.

21

22 The Reference Case fuel price projections considered throughout Exhibit No. ___
23 [FMPA-1] reflect the region-specific fuel price projections for use in the electric
24 power sector.

1 **Q. Were any adjustment made to the AEO2007 region-specific Reference Case**
2 **fuel price projections?**

3 A. Yes. The AEO2007 fuel price projections were developed in real 2005 dollars.
4 For purposes of the economic evaluations presented in Exhibit No. __[FMPA-1],
5 these projections were converted to nominal dollars using the general inflation
6 rate of 2.3 percent discussed in the testimony of Mr. Myron Rollins.

7
8 **Q. How were forecasts of nuclear fuel price projections developed?**

9 A. Projections of nuclear fuel prices were based on nuclear fuel price projections
10 used in previous analyses we performed for FMPA. Those costs were adjusted
11 to reflect the general inflation rate of 2.3 percent discussed in the testimony of
12 Mr. Myron Rollins.

13
14 **Q. What were the resulting Reference Case fuel price projections used**
15 **throughout Exhibit No. __ [FMPA-1].**

16 A. The Reference Case fuel price projections used throughout the economic
17 evaluations are presented in Exhibit No. __ [BEK-2].

18
19 **Q. Were solid fuel alternatives among those considered as viable generation**
20 **expansion options?**

21 A. Biomass generation was the only solid fuel alternative considered for this
22 analysis. A discussion of the biomass generation considered in the analysis is
23 provided in the testimony of Mr. Nicholas Guarriello. Due to permitting and
24 regulatory uncertainties, coal-fired generating alternatives were not considered

1 for Cane Island 4. Nuclear units were only considered in terms of the potential
2 identified joint ownership opportunities with Florida Power & Light and
3 Progress Energy Florida.

4
5 **Q. Did the economic analyses consider the costs associated with emission**
6 **allowances?**

7 A. Yes. AEO2007 considers the potential impact of both the Clean Air Interstate
8 Rule (CAIR) and the Clean Air Mercury Rule (CAMR). Subsequent to
9 completion of the AEO2007, the US Court of Appeals for the District of
10 Columbia Circuit vacated the CAMR in a decision issued February 8, 2008.
11 Because Exhibit No. __ [FMPA-1] does not consider the addition of any coal
12 fired generating units as future resource alternatives, the impact of the current
13 uncertainty associated with regulation of mercury emissions is insignificant in
14 the analyses presented throughout this Application. Costs associated with
15 emissions of mercury are not considered in this Application. The economic
16 analysis uses the forecast allowance prices for emissions of SO₂ and NO_x from
17 the AEO2007 Reference Case fuel forecast, as well as the High Price and Low
18 Price fuel forecasts.

19
20 Emission allowance price forecasts for SO₂, NO_x, and CO₂ were also developed
21 for hypothetical sensitivity evaluations in which emissions of CO₂ would be
22 regulated in the US.

23

1 **Q. How were the emissions prices for CO₂ derived, given that CO₂ emissions**
2 **are not currently regulated?**

3
4 A. Although CO₂ emissions are not currently regulated, the EIA developed analyses
5 of two of the major pieces of proposed legislation. The two proposed bills
6 analyzed were *S. 280, the Climate Stewardship and Innovation Act of 2007* and
7 *S.1766, the Low Carbon Economy Act of 2007*. The CO₂ emission allowance
8 price projections presented in the EIA's analysis of S.280 were generally higher
9 than for S. 1766.

10
11 In addition, the EPA recently developed CO₂ cost estimates for *S. 2191,*
12 *America's Climate Security Act of 2007*. The EPA's cost estimates are higher
13 than those developed by EIA in their analysis of S.280. For that reason, the EPA
14 estimates were utilized in the high CO₂ sensitivity analysis presented in Section
15 20.0 of the Need for Power Application, Exhibit No. __ [FMPPA-1].

16
17 **Q. How were the detailed economic analyses conducted?**

18 A. The optimal generation expansion plan evaluations were performed using
19 STRATEGIST, a computer software system developed by Ventyx (previously
20 NewEnergy Associates, LLC.). STRATEGIST is the updated version of
21 PROSCREEN.

1 **Q. How does STRATEGIST determine the most optimal generation plan?**
2 A. STRATEGIST includes an automatic expansion planning module which
3 determines the optimal balanced demand and supply plan for a utility system
4 under a prescribed set of constraints and assumptions. It evaluates all
5 combinations of generating unit alternatives and purchase power options in
6 conjunction with existing capacity resources to satisfy forecast capacity
7 requirements while maintaining user-defined reliability criteria. STRATEGIST
8 simulates the operation of a utility system to determine the cost and reliability
9 effects of adding resources to the system or modifying the load through demand-
10 side management (DSM) programs. The expansion plan that results in the
11 lowest cumulative present worth of costs (CPWC) is the optimal generation
12 plan.

13
14 **Q. How did STRATEGIST simulate utility system operation to arrive at the
15 optimal generation plan for FMPA?**

16 A. The simulation of the utility system operation is accomplished using dynamic
17 programming, a mathematical technique useful for making a sequence of
18 interrelated decisions for determining the combination of decisions that
19 optimizes the desired outcome (lowest CPWC in this case). In this Application,
20 all expansion plans were analyzed over a 20 year period from 2008 through
21 2027.

22

1 Q. What supply-side alternatives were included in the detailed economic
2 analysis?

3 A. The detailed economic analysis considered the following generating unit
4 alternatives:

- 5 • GE LM6000 Simple Cycle
- 6 • GE LMS100 Simple Cycle
- 7 • GE 7EA Simple Cycle
- 8 • GE 7FA Simple Cycle
- 9 • GE 1x1 7FA Combined Cycle

10 In addition, the economic impacts of renewable (biomass and photovoltaic
11 resources) and DSM proposals available to FMPA were evaluated. Further
12 description of these proposals is provided in the testimony of Mr. Nicholas
13 Guarriello and Mr. Thomas Reedy.

14
15 Four distinct scenarios were developed. Scenario 1 considered the addition of
16 only combustion turbine and combined cycle generating units. Scenario 2
17 considered the addition of new renewable energy resources supplemented by
18 combustion turbine and combined cycle generating unit alternatives when
19 additional capacity was needed. Scenario 3 considered the addition of new
20 DSM resources supplemented by combustion turbine and combined cycle
21 generating unit alternatives when additional capacity was needed. Scenario 4
22 considered the addition of both the new renewable energy resources and the new
23 DSM resources again supplemented by combustion turbine and combined cycle
24 generating alternatives when additional capacity was needed.

1

2 **Q. How was the least-cost capacity expansion plan identified for FMPA?**

3 A. STRATEGIST was used to identify the optimal, or least cost, expansion plan
4 based on CPWC. The CPWC which are presented in Exhibit No. __[BEK-5]
5 include production costs consisting of fuel, purchase power, variable O&M, and
6 emission allowance costs and fixed costs consisting of fixed O&M, fixed
7 charges on new generating units, DSM charges, and incremental natural gas
8 transportation charges. The CPWC are presented in 2008 dollars over the 2008
9 through 2027 evaluation period using the 5.0 percent present worth discount rate
10 discussed in the testimony of Mr. Myron Rollins.

11

12 **Q. What were the results of the economic analysis for FMPA?**

13 A. Analysis of the CPWC associated with each of the cases analyzed indicates that
14 expansion plans including the addition of Cane Island 4 in May 2011 are the
15 most cost-effective expansion plans for all cases considered.

16

17 **Q. Did you conduct any sensitivity analyses?**

18 A. Yes.

19

20 **Q. Please provide an overview of this sensitivity analysis.**

21 A. Sensitivity analyses were performed on the Scenario 1 cases to supplement the
22 base case economic analysis and to demonstrate the robustness of the capacity
23 expansion plans. The sensitivity analyses measure the impact of varying key

1 assumptions used in the base case economic analysis, as well as the impacts of
2 considerations not included in the base case.

3
4 The general methodology used in the sensitivity analyses was similar to the
5 methodology used in the base case analysis described previously in my
6 testimony. STRATEGIST was used to determine the optimal capacity
7 expansion plan for all cases considered under different sensitivity cases.

8

9 **Q. What sensitivity analyses were conducted?**

10 A. Sensitivity analyses were developed to evaluate the impact of:

- 11 1. High fuel prices
- 12 2. Low fuel prices
- 13 3. High loads
- 14 4. Low loads
- 15 5. High capital costs
- 16 6. Regulated CO₂
- 17 7. High fuel prices with regulated CO₂
- 18 8. High CO₂ costs

19

20 **Q. What were the results of these sensitivity analyses?**

21 A. Exhibit No. ____ [BEK-5] presents a summary of the results of all of the
22 economic evaluations, including each of the sensitivity analyses performed. As
23 shown in Exhibit No. ____ [BEK-5], the addition of Cane Island 4 in May 2011

1 represents the least-cost capacity expansion plan under all sensitivity
2 evaluations.

3
4 The results of the sensitivity analyses, coupled with the results of the base case
5 analysis, demonstrate that the capacity expansion plan including the addition of
6 Cane Island 4 in May 2011 is a robust plan, and is sufficiently flexible to
7 overcome variations and deviations from the base case assumptions.

8

9 **Q. Is Cane Island 4 the most cost-effective alternative available to FMPA?**

10 A. Yes. Cane Island 4 is the most cost-effective alternative available to FMPA. In
11 Scenario 1 (conventional resources), the addition of Cane Island 4 in May 2011
12 will result in CPWC savings of approximately \$36 million when compared to
13 the least cost plan with Cane Island 4 not installed in May 2011. The amount of
14 CPWC savings for the sensitivity evaluations ranges from approximately \$22
15 million to approximately \$81 million.

16

17 In Scenario 2 (conventional and renewable resources), the addition of Cane
18 Island 4 in May 2011 will result in CPWC savings of approximately \$34 million
19 when compared to the least cost plan with Cane Island 4 not installed in May
20 2011. In Scenario 3 (conventional and DSM), the addition of Cane Island 4 in
21 May 2011 will result in CPWC savings of approximately \$53 million when
22 compared to the least cost plan with Cane Island 4 not installed in May 2011. In
23 Scenario 4 (conventional, renewable, and DSM), the addition of Cane Island 4

1 in May 2011 will result in CPWC savings of approximately \$38 million when
2 compared to the least cost plan with Cane Island 4 not installed in May 2011.

3
4 Regulated CO₂ sensitivity evaluations were performed for every scenario
5 considered in Exhibit No. __ [FMPA-1]. For all scenarios considered, the
6 addition of Cane Island 4 in May 2011 represents the most cost-effective
7 alternative available to FMPA.

8

9 **Q. Will Cane Island 4 provide adequate electricity at a reasonable cost to**
10 **FMPA Members?**

11 A. Yes. The expansion plan with Cane Island 4 in 2011 will help to meet each
12 Member's electric generation needs at the lowest cost of all the alternatives
13 evaluated.

14

15 **Q. Have renewable energy sources and technologies, as well as conservation**
16 **measures been evaluated to the extent that they are reasonably available to**
17 **FMPA in the economic evaluations?**

18 A. Yes. As discussed in the testimony of Mr. Nicholas Guarriello and Mr. Thomas
19 Reedy, FMPA implemented RFP processes to identify available renewable
20 energy sources and technologies as well as conservation measures. The results
21 of the economic evaluations demonstrate that Cane Island 4 is the most cost
22 effective alternative available to FMPA including consideration of reasonably
23 available renewable energy sources and technologies as well as conservation
24 measures.

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Q. What are the consequences to FMPA of delaying Cane Island Unit 4?

A. As demonstrated by the economic evaluations presented in the Application, the results of which are summarized in Exhibit No. __ [BEK-5], the addition of Cane Island Unit 4 in 2011 represents the most cost-effective addition to satisfy FMPA's forecast capacity requirements to reliably serve the ARP members. The consequences of delaying the commercial operation of Cane Island 4 are significant from an economic and reliability standpoint for FMPA.

If the commercial operation of Cane Island 4 is delayed, FMPA would be required to replace the capacity and energy that would otherwise be provided by a new, efficient combined cycle generating unit. The economic consequence of delaying the commercial operation of Cane Island Unit 4 for 2 years (from May 2011 until May 2013) is approximately \$35.7 million in CPWC, compared to the next most cost effective expansion plan that meets FMPA's 2011 capacity requirements with simple cycle combustion turbines.

FMPA is projected to require a significant amount of capacity in the summer of 2011 to maintain its reserve margin requirements. If Cane Island Unit 4 is delayed and no additional generating capacity is installed to meet FMPA's forecast capacity requirements by 2011, FMPA's summer reserve margin will fall to approximately -1.3 percent (or 286 MW less than the 18 percent summer reserve criterion) in 2011. The projected capacity deficit in the summer of 2011 is equivalent to nearly all of the capacity that will be provided by Cane Island

1 Unit 4. With a projected negative reserve margin in 2011, FMPA would not be
2 able to serve firm load with resources under FMPA's control. This would
3 increase the probability that FMPA will not be able to provide FMPA's
4 members with capacity to serve their retail customers and will expose FMPA to
5 potentially high purchase power costs.

6

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

8 **A. Yes.**

9

*Utility System Planning,
Production Costing,
Economic Analysis, and
Demand-Side
Management*

Resume of
Bradley E. Kushner
Black & Veatch

Mr. Kushner is responsible for production costing associated with utility system expansion planning, as well as feasibility studies and economic analysis, and demand-side management evaluation. He has also been involved in the issuance and evaluation of requests for proposals (RFPs) and portfolio evaluations. Mr. Kushner has also presented expert testimony and prepared other experts for testimony related to determination of need proceedings, and has also testified under cross examination by intervening parties.

Education

Bachelors, Mechanical
Engineering, University of
Missouri at Columbia, 2000

Total Years Experience

8

Joined Black & Veatch
2000

Representative Project Experience

Valuation of Generating Unit Portfolio; Confidential Client

2007 - Present

Study Manager. Oversee modeling and evaluation of purchase power contracts related to Client's portfolio of generation assets throughout North America. The purchase power contracts are being modeled to assess a monetary value to be used as guidance for valuation of overall generation portfolio. The portfolio of assets and associated purchase power contracts includes more than 50 models. Mr. Kushner is involved in the modeling of the contracts as well as quality assurance/quality control related to the entire portfolio prior to delivering evaluations to Client.

Characterization and Selection of Nuclear Generating Technologies; AmerenUE; Missouri

2007 - Present

Project Analysis Engineer. Provide assistance in characterizing and screening of various nuclear generating technologies for consideration by AmerenUE. The nuclear technology selected for further evaluation will be evaluated as part of Client's Integrated Resource Plan (IRP) study. The characterization included consideration of provisions of the Energy Policy Act of 2005 related to new qualifying nuclear plant capacity as well as relative comparisons of competing nuclear generating technologies. Client deliverables included two separate presentations to AmerenUE's Stakeholders.

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***Supply-Side Technologies Characterization; Tampa Electric Company;
Tampa, Florida***

2007

Study Manager. Provide cost and performance estimates for various renewable, conventional, and other generating technologies for client consideration in support of their determination of need filing. Technologies considered approximately 20 renewable technologies (including biomass, biogas, waste-to-energy, wind, solar, geothermal, hydroelectric, and ocean energy), 6 conventional technologies (including simple and combined cycles), and 2 emerging technologies (including nuclear). Also considered advanced, energy storage, and distributed generation technologies.

Education

Bachelors, Mechanical
Engineering, University of
Missouri at Columbia, 2000

Total Years Experience

8

Joined Black & Veatch

2000

***Power Supply Study; Western Farmers Electric Cooperative; Anadarko,
Oklahoma***

2006 - Present

Study Manager. Provide production costing, economic analysis, and various other support to facilitate completion of the Western Farmers Electric Cooperative (WFEC) Power Supply Study. The WFEC Power Supply Study is an update to previous capacity planning studies which evaluates the economics of various supply-side alternatives to satisfy forecast capacity requirements.

Integrated Resource Plan; Village of Rockville Centre, New York

2006 - Present

Study Manager. Analysis related to and preparation of the Village of Rockville Centre (RVC) Integrated Resource Plan (IRP). The IRP will include consideration of RVC's existing generating system and strategic planning to satisfy forecasted system requirements. The strategic planning process includes consideration of conventional supply-side options, interaction with the purchase power market, demand-side management measures, renewable supply-side alternatives, and possible future environmental impacts.

***Taylor Energy Center Need for Power Application; Various Clients,
Florida***

2005 - 2007

Study Manager. Provide production costing, economic analysis, and various other support to facilitate completion and filing of the Taylor Energy Center (TEC) Need for Power Application (NFP). Also includes preparation of testimony related to the project to the Florida Public Service Commission (FPSC). The NFP provides a determination of the most cost-effective capacity addition to satisfy forecasted capacity

requirements for the four separate utilities participating in the project. The analysis considered self-build and purchase power alternatives.

***Integrated Resource Plan; City of Tallahassee; Tallahassee, Florida
2004 - 2007***

Study Manager. Analysis related to and preparation of the City of Tallahassee's (the City's) Integrated Resource Plan (IRP). The IRP will include consideration of the City's existing generating system and strategic planning to satisfy forecasted system requirements. The strategic planning process includes consideration of conventional supply-side options, demand-side management measures, renewable supply-side alternatives, and possible future environmental impacts.

***Integrated Resource Plan; Brazos Electric Power Cooperative, Texas
2005 - 2006***

Project Analysis Engineer. Provide assistance to Brazos Electric Power Cooperative (Brazos) in developing their Integrated Resource Plan (IRP). Includes drafting a request for power supply proposals (RFP), analysis of responses to the RFP, review of Brazos production costing analysis, and documentation of final report. The IRP will provide strategic direction to Brazos, which is currently experiencing and is forecast to continue to experience robust system growth.

***Stanton Energy Center Unit B Need for Power Application; Orlando
Utilities Commission; Orlando, Florida
2005 - 2006***

Study Manager. Provided production costing, economic analysis, and various other support to facilitate completion and filing of the Stanton Energy Center Unit B (Stanton B) Need for Power Application (NFP). Also included preparation of testimony related to the project to the Florida Public Service Commission (FPSC). The NFP provides a determination of the most cost-effective capacity addition to satisfy forecasted capacity requirements for the Orlando Utilities Commission. The FPSC approved the Stanton B NFP Application in May 2006, which represents the first coal-fired power plant approved in the State of Florida since 1991.

***RFP Issuance and Evaluation; Western Farmers Electric Cooperative;
Anadarko, Oklahoma
2002 - 2006***

Project Analysis Engineer. Coordinated with Western Farmers Electric Cooperative (WFEC) to draft, issue, and evaluate a capacity solicitation (RFP) to secure forecast capacity requirements in most cost-effective and reliable manner. The RFP process was undertaken through coordination with Rural Utilities Services (RUS) in an effort to obtain low-cost RUS

project financing. Involved evaluation of numerous conventional as well as renewable technology proposals and culminated in the issuance of a short-list and presentation to WFE Board of Directors.

***Saint Johns River Power Park Annual Review; JEA; Jacksonville, Florida
2006***

Engineering Manager. Preparation of annual report documenting the previous year's operations of the St. Johns River Power Park. Included a summary of the findings of field activities, staff interviews, observations, and document review associated with the Power Park.

***Ten-Year Site Plan, FRCC Forms, EIA-860 and Annual Conservation Report Filings; Orlando Utilities Commission; Orlando, Florida
2006***

Engineering Manager. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2006 Ten-Year Site Plan and submit to the Florida Public Service Commission (FPSC). Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC. The EIA-860 collects data related to the specific utility's existing and planned generating units. The Annual Conservation Report is prepared and submitted to the FPSC in order to summarize the utility's conservation and demand-side management efforts.

***RFP Issuance and Evaluation; City of Columbia, Water & Light Department; Columbia, Missouri
2005 - 2006***

Study Manager. Coordinate with the City of Columbia, Water & Light Department (the City) to draft, issue, and evaluate a capacity solicitation (RFP) to secure forecast capacity requirements in most cost-effective and reliable manner. Involved evaluation of numerous conventional capacity options under consideration by the City, as well as options proposed by respondents to the RFP. Included continuous communication with City staff as well as presentations to the City's planning committee.

***Treasure Coast Energy Center Need for Power Application; Florida Municipal Power Agency; Orlando, Florida
2004 - 2005***

Project Analysis Engineer. Provided production costing, economic analysis, and various other support to facilitate completion and filing of the Florida Municipal Power Agency's (FMPA) Need for Power Application (NFP). Also provided testimony related to the project to the

Florida Public Service Commission (FPSC). The NFP provides a determination of the most cost-effective capacity addition to satisfy forecasted capacity requirements. The analysis performed for FMPA considered self-build and purchase power alternatives. The NFP Application was approved by the FPSC in July, 2005, representing a critical step in the permitting and licensing process in the State of Florida.

***Stock Island Combustion Turbine Evaluation; Florida Municipal Power Agency; Orlando, Florida
2004 - 2005***

Project Analysis Engineer. Perform production costing and economic analysis to determine the most cost-effective capacity additions to be located at the Stock Island site. The analysis considered two different generating units from specific manufacturers, who responded to FMPA's request for bids.

***Generation Expansion Study; Oman
2005***

Project Analysis Engineer. Performed production costing and economic analysis to determine the most cost-effective capacity additions to satisfy forecast capacity requirements in the Country of Oman. The analysis considered seven different generating technologies.

***Integrated Resource Plan; Golden Valley Electric Association;
Fairbanks, Alaska
2005***

Project Analysis Engineer. Economic analysis in support of the Golden Valley Electric Association's (GVEA) Integrated Resource Plan (IRP). The IRP will provide GVEA with recommendations of capacity additions which will satisfy forecasted capacity requirements in the most cost-effective manner.

***Ten-Year Site Plan and FRCC Forms; Florida Municipal Power Agency; Orlando, Florida
2005***

Engineering Manager. Provided assistance and support to the Florida Municipal Power Agency (FMPA) related to its 2005 Ten-Year Site Plan and subsequent submission to the Florida Public Service Commission (FPSC). Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC.

***Saint Johns River Power Park Annual Review; JEA; Jacksonville, Florida
2005***

Engineering Manager. Preparation of annual report documenting the previous year's operations of the St. Johns River Power Park. Included a summary of the findings of field activities, staff interviews, observations, and document review associated with the Power Park.

***Ten-Year Site Plan, FRCC Forms, EIA-860 and Annual Conservation Report Filings; Orlando Utilities Commission; Orlando, Florida
2005***

Engineering Manager. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2005 Ten-Year Site Plan and submit to the Florida Public Service Commission (FPSC). Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC. The EIA-860 collects data related to the specific utility's existing and planned generating units. The Annual Conservation Report is prepared and submitted to the FPSC in order to summarize the utility's conservation and demand-side management efforts.

***Due Diligence and Economic Analysis; Dairyland Power Cooperative; La Crosse, Wisconsin
2003-2005***

Project Analysis Engineer. Performed due diligence review of the power supply planning efforts undertaken by Dairyland Power Cooperative (DPC). Included development of numerous capacity expansion plans and associated system production costing. Analysis was done in compliance with the requirements of the Rural Utilities Services (RUS) to potentially obtain low-cost RUS project financing. Also included was a presentation of the study's findings to the DPC Board of Directors. Following the issuance of a request for proposals (RFP) for capacity supplies, Black & Veatch was released to perform additional production costing and evaluations of the bids and self-build options was completed, with the results presented to DPC project personnel as well as RUS staff.

***Numeric Conservation Goals Filing; JEA; Jacksonville, Florida
2004***

Project Analysis Engineer. Analysis related to and preparation of the JEA 2004 Petition for Approval of Numeric Conservation Goals, as required by the Florida Public Service Commission (FPSC). The submittal included analysis of numerous demand-side management (DSM) measures to be

considered by JEA in order to determine their cost-effectiveness. The process is required to be completed by JEA every five years, culminating in the eventual determination by the FPSC of the conservation goals JEA must satisfy each year.

Numeric Conservation Goals Filing; Orlando Utilities Commission; Orlando, Florida

2004

Project Analysis Engineer. Analysis related to and preparation of the Orlando Utilities Commission (OUC) 2004 Petition for Approval of Numeric Conservation Goals, as required by the Florida Public Service Commission (FPSC). The submittal included analysis of numerous demand-side management (DSM) measures to be considered by OUC in order to determine their cost-effectiveness. The process is required to be completed by OUC every five years, culminating in the eventual determination by the FPSC of the conservation goals OUC must satisfy each year.

Site Selection Study; Florida Municipal Power Agency; Orlando, Florida

2004

Project Analysis Engineer. Coordination and preparation of a site selection study related to the potential construction of a new combined cycle unit to be installed by the Florida Municipal Power Agency.

Ten-Year Site Plan; Florida Municipal Power Agency; Orlando, Florida

2004

Engineering Manager. Provided assistance and support to the Florida Municipal Power Agency (FMPA) related to its 2004 Ten-Year Site Plan and subsequent submission to the Florida Public Service Commission (FPSC).

Saint Johns River Power Park Annual Review; JEA; Jacksonville, Florida

2004

Engineering Manager. Preparation of annual report documenting the previous year's operations of the St. Johns River Power Park. Included a summary of the findings of field activities, staff interviews, observations, and document review associated with the Power Park.

Ten-Year Site Plan, FRCC Forms, and Annual Conservation Report Filings; Orlando Utilities Commission; Orlando, Florida

2004

Engineering Manager. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2004 Ten-Year

Site Plan and submit to the Florida Public Service Commission (FPSC). Also included follow-up response to FPSC inquiries and preparation of presentation to FPSC staff. Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC. Annual Conservation Report is prepared and submitted to the FPSC in order to summarize the utility's conservation and demand-side management efforts.

***Due Diligence; City Utilities; Springfield, Missouri
2003***

Project Analysis Engineer. Due diligence and economic analysis to determine the most cost-effective capacity additions to satisfy forecasted system requirements for City Utilities – Springfield. Two options were considered, consisting of constructing a second unit at an existing site and an independent developer's proposed construction of a unit at a new site.

***Saint Johns River Power Park Annual Review; JEA; Jacksonville, Florida
2003***

Engineering Manager. Preparation of annual report documenting the previous year's operations of the St. Johns River Power Park. Included a summary of the findings of field activities, staff interviews, observations, and document review associated with the Power Park.

***Participation Agreement; Kissimmee Utility Authority; Orlando, Florida
2003***

Engineering Manager. Development of a Participation Agreement between client (KUA) and another Florida utility governing ownership, construction, and operation of a new generating unit at a KUA site. Included meetings and coordination with clients and incorporation of various requirements to sufficiently complete the Agreement.

***Ten-Year Site Plan, FRCC Forms, and Annual Conservation Report Filings; Orlando Utilities Commission; Orlando, Florida
2003***

Engineering Manager. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2003 Ten-Year Site Plan and submit to the Florida Public Service Commission (FPSC). Also included follow-up response to FPSC inquiries and preparation of presentation to FPSC staff. Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC. Annual Conservation Report

is prepared and submitted to the FPSC in order to summarize the utility's conservation and demand-side management efforts.

***Capacity Planning Study; Western Farmers Electric Cooperative; Anadarko, Oklahoma
2001 - 2002***

Project Analysis Engineer. Production costing and economic analysis to determine WFEC's most cost-effective expansion options to meet forecast capacity requirements. The capacity planning study was performed in support of the RFP issuance described above.

***Feasibility Study; Kissimmee Utility Authority; Kissimmee, Florida
2002***

Engineering Manager. Assisted in coordination and preparation of a preliminary study to evaluate the feasibility of constructing a new generating unit at an existing Kissimmee Utility Authority site.

***Ten-Year Site Plan, FRCC Forms, and Annual Conservation Report Filings; Orlando Utilities Commission; Orlando, Florida
2002***

Project Analysis Engineer. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2002 Ten-Year Site Plan and submit to the Florida Public Service Commission (FPSC). Also included follow-up response to FPSC inquiries and preparation of presentation to FPSC staff. Related to the Ten-Year Site Plan are the Florida Reliability Coordinating Council (FRCC) filings, which are submitted to FRCC via electronic database and forwarded to the Energy Information Administration (EIA) by FRCC. Annual Conservation Report is prepared and submitted to the FPSC in order to summarize the utility's conservation and demand-side management efforts.

***Capacity Planning Study; Braintree Electric Light Department; Braintree, Massachusetts
2002***

Project Analysis Engineer. Production costing and economic analysis to determine Braintree Electric Light Department's most cost-effective expansion options to meet forecast capacity requirements.

***Integrated Resource Plan; City of Tallahassee; Tallahassee, Florida
2001-2002***

Project Analysis Engineer. Assisted in completion of the City of Tallahassee's Integrated Resource Plan (IRP), including evaluation of the City's demand-side management program alternatives.

Capacity Planning Study; Basin Electric Power Cooperative; Bismarck, North Dakota

2001

Project Analysis Engineer. Production costing and economic analysis necessary to provide Basin Electric Power Cooperative with recommendations as to which capacity additions would be most cost-effective to satisfy system requirements.

Ten-Year Site Plan; Lakeland Electric; Lakeland, Florida

2001

Project Analysis Engineer. Assisted in completion of Lakeland Electric's 2001 Ten-Year Site Plan, including consideration of Lakeland's capacity addition options.

Ten-Year Site Plan; Orlando Utilities Commission; Orlando, Florida

2001

Project Analysis Engineer. Production costing and economic analysis necessary to complete the Orlando Utilities Commission 2001 Ten-Year Site Plan and submit to the Florida Public Service Commission. Also included follow-up response to FPSC inquiries and preparation of presentation to FPSC staff.

Need for Power Application; Various Clients; Florida

2001

Project Analysis Engineer. Production costing and economic analysis required in support of determination of most cost-effective expansion options to meet the individual needs of the Orlando Utilities Commission, Kissimmee Utility Authority, and Florida Municipal Power Agency. Also included preparation of corresponding application to be presented to the Florida Public Service Commission, as well as written testimony in support thereof.

Table 1
Reference Case Price Projections
Forecast of Natural Gas and Fuel Oil Delivered to the
Florida Reliability Coordinating Council Boundary⁽¹⁾

| Year | Natural Gas (Nominal \$/MBtu) ⁽²⁾ | Distillate Fuel Oil (Nominal \$/MBtu) ⁽³⁾ | Residual Fuel Oil (Nominal \$/MBtu) |
|------|---|---|--|
| 2008 | \$7.76 | \$14.73 | \$8.46 |
| 2009 | \$7.33 | \$13.88 | \$7.95 |
| 2010 | \$7.17 | \$13.14 | \$7.59 |
| 2011 | \$6.79 | \$12.50 | \$7.32 |
| 2012 | \$6.78 | \$12.03 | \$7.08 |
| 2013 | \$6.77 | \$11.37 | \$7.04 |
| 2014 | \$6.96 | \$11.52 | \$6.99 |
| 2015 | \$7.04 | \$11.86 | \$7.26 |
| 2016 | \$7.41 | \$12.20 | \$7.41 |
| 2017 | \$7.83 | \$12.70 | \$7.74 |
| 2018 | \$8.02 | \$13.13 | \$7.97 |
| 2019 | \$8.22 | \$13.68 | \$8.39 |
| 2020 | \$8.52 | \$14.12 | \$8.69 |
| 2021 | \$8.66 | \$14.62 | \$9.06 |
| 2022 | \$9.02 | \$15.18 | \$9.45 |
| 2023 | \$9.37 | \$15.48 | \$9.56 |
| 2024 | \$9.83 | \$16.08 | \$10.00 |
| 2025 | \$10.04 | \$16.51 | \$10.27 |
| 2026 | \$10.32 | \$16.99 | \$10.66 |
| 2027 | \$10.70 | \$17.68 | \$10.97 |

⁽¹⁾ Based on data presented in Supplemental Table 69 to the AEO2007 Reference Case.

⁽²⁾ Natural gas price projections do not include usage charges or firm or interruptible transportation charges within the state. These costs are accounted for in the economic analysis as discussed in Section 19.0 of Exhibit No. [FMPPA-1].

⁽³⁾ Distillate fuel oil price projections reflect the "nonroad, locomotive, and marine" (NRLM) diesel regulation finalized in May 2004, which requires sulfur content for all NRLM diesel fuel produced by refiners to be reduced to 500 parts per million (ppm) starting in mid-2007. NRLM also establishes a new ultra-low sulfur diesel (ULSD) limit of 15 ppm for nonroad diesel by mid-2010.

| Table 2 Reference Case Price Projections Forecast of Low Sulfur Central Appalachian Coal Delivered to the Georgia/Florida Region ⁽¹⁾ | |
|--|--|
| Year | Low Sulfur Central Appalachian ⁽²⁾ (0.54 lb S/MBtu) (Nominal \$/MBtu) |
| 2008 | \$3.08 |
| 2009 | \$3.15 |
| 2010 | \$3.28 |
| 2011 | \$3.39 |
| 2012 | \$3.38 |
| 2013 | \$3.45 |
| 2014 | \$3.56 |
| 2015 | \$3.60 |
| 2016 | \$3.69 |
| 2017 | \$3.73 |
| 2018 | \$3.70 |
| 2019 | \$3.70 |
| 2020 | \$3.77 |
| 2021 | \$3.83 |
| 2022 | \$3.97 |
| 2023 | \$4.07 |
| 2024 | \$4.16 |
| 2025 | \$4.24 |
| 2026 | \$4.30 |
| 2027 | \$4.39 |

⁽¹⁾ Based on data received directly from the EIA.
⁽²⁾ EIA price projections for Central Appalachian coal delivered to the Georgia/Florida region only extend through 2017, as the AEO2007 Reference Case assumes production from the Eastern Interior region, as well as imports, will contribute to the decline in Appalachia's share of the market east of the Mississippi. Beyond 2017, prices were developed on the basis of minemouth projections from the AEO2007 Reference Case and the assumption that transportation costs will remain constant in 2005 dollars.

Table 3
High Case Price Projections
 Forecast of Natural Gas, Fuel Oil, and Central Appalachian Coal Delivered to the Florida Reliability Coordinating Council⁽¹⁾

| Year | Natural Gas (Nominal \$/MBtu) ⁽²⁾ | Distillate Fuel Oil (Nominal \$/MBtu) | Residual Fuel Oil (Nominal \$/MBtu) | Low Sulfur Central Appalachian (0.54 lb S/MBtu) (Nominal \$/MBtu) |
|------|---|--|--|--|
| 2008 | \$8.14 | \$15.11 | \$8.82 | \$3.08 |
| 2009 | \$7.95 | \$15.03 | \$8.65 | \$3.17 |
| 2010 | \$7.88 | \$15.25 | \$8.72 | \$3.31 |
| 2011 | \$7.84 | \$15.38 | \$9.17 | \$3.43 |
| 2012 | \$7.59 | \$15.58 | \$9.86 | \$3.42 |
| 2013 | \$7.71 | \$15.86 | \$10.93 | \$3.49 |
| 2014 | \$7.94 | \$16.87 | \$11.62 | \$3.61 |
| 2015 | \$8.18 | \$17.81 | \$12.36 | \$3.65 |
| 2016 | \$8.64 | \$18.80 | \$12.96 | \$3.76 |
| 2017 | \$9.06 | \$19.59 | \$13.90 | \$3.81 |
| 2018 | \$9.13 | \$20.51 | \$14.74 | \$3.79 |
| 2019 | \$9.02 | \$20.99 | \$15.19 | \$3.81 |
| 2020 | \$9.56 | \$21.86 | \$15.95 | \$3.90 |
| 2021 | \$10.10 | \$22.13 | \$16.42 | \$3.99 |
| 2022 | \$10.47 | \$22.84 | \$16.78 | \$4.14 |
| 2023 | \$11.04 | \$23.23 | \$17.50 | \$4.25 |
| 2024 | \$11.38 | \$24.00 | \$18.02 | \$4.36 |
| 2025 | \$11.87 | \$24.44 | \$18.69 | \$4.44 |
| 2026 | \$12.53 | \$25.10 | \$19.38 | \$4.50 |
| 2027 | \$13.08 | \$25.81 | \$19.86 | \$4.57 |

⁽¹⁾ Based on data presented in Supplemental Table 69 (Reference Case), Table 12 (Reference Case), Table 12 (High Price Case), Table 13 (Reference Case), and Table 13 (High Price Case) in the AEO2007.

⁽²⁾ Natural gas price projections do not include usage charges or intrastate firm or interruptible transportation charges. These costs are accounted for in the economic analysis as discussed in Section 19.0 of Exhibit No. ____ [FMFA-1]

Table 4
Low Case Price Projections
Forecast of Natural Gas, Fuel Oil, and Central Appalachian Coal Delivered to the Florida Reliability Coordinating Council⁽¹⁾

| Year | Natural Gas (Nominal \$/MBtu) ⁽²⁾ | Distillate Fuel Oil (Nominal \$/MBtu) | Residual Fuel Oil (Nominal \$/MBtu) | Low Sulfur Central Appalachian (0.54 lb S/MBtu) (Nominal \$/MBtu) |
|------|---|--|--|--|
| 2008 | \$7.44 | \$13.85 | \$8.34 | \$3.07 |
| 2009 | \$6.80 | \$12.18 | \$7.39 | \$3.13 |
| 2010 | \$6.43 | \$10.60 | \$6.53 | \$3.25 |
| 2011 | \$6.11 | \$9.42 | \$5.86 | \$3.36 |
| 2012 | \$5.85 | \$8.30 | \$5.09 | \$3.34 |
| 2013 | \$5.69 | \$7.51 | \$5.17 | \$3.41 |
| 2014 | \$5.73 | \$7.19 | \$4.82 | \$3.50 |
| 2015 | \$5.72 | \$7.07 | \$4.68 | \$3.53 |
| 2016 | \$6.09 | \$7.15 | \$4.65 | \$3.62 |
| 2017 | \$6.29 | \$6.95 | \$4.85 | \$3.65 |
| 2018 | \$6.59 | \$7.02 | \$4.87 | \$3.62 |
| 2019 | \$6.90 | \$7.40 | \$4.96 | \$3.62 |
| 2020 | \$7.05 | \$7.41 | \$5.08 | \$3.67 |
| 2021 | \$7.38 | \$7.63 | \$5.22 | \$3.71 |
| 2022 | \$7.79 | \$7.95 | \$5.30 | \$3.87 |
| 2023 | \$7.97 | \$8.18 | \$5.44 | \$3.96 |
| 2024 | \$8.44 | \$8.55 | \$5.61 | \$4.04 |
| 2025 | \$8.57 | \$9.22 | \$5.83 | \$4.10 |
| 2026 | \$8.95 | \$9.12 | \$6.05 | \$4.14 |
| 2027 | \$9.27 | \$9.40 | \$6.00 | \$4.21 |

⁽¹⁾ Based on data presented in Supplemental Table 69 (Reference Case), Table 12 (Reference Case), Table 12 (Low Price Case), Table 13 (Reference Case), and Table 13 (Low Price Case) in the AEO2007.

⁽²⁾ Natural gas price projections do not include usage charges or intrastate firm or interruptible transportation charges. These costs are accounted for in the economic analysis as discussed in Section 19.0 of Exhibit No. ____ [FMPPA-1]

| Table 5 CPWC Summaries for Scenario 1 - Conventional Expansion Scenario (\$000) | | | |
|---|--|--|--|
| Case | CPWC of Expansion Plan Including Cane Island 4 in 2011 | CPWC of Expansion Plan Without Cane Island 4 in 2011 | CPWC Savings for Expansion Plan with Cane Island 4 in 2011 |
| Reference Case | \$6,873,504 | \$6,909,247 | \$35,763 |
| High Fuel | \$7,521,022 | \$7,558,293 | \$37,271 |
| Low Fuel | \$6,215,140 | \$6,243,170 | \$28,030 |
| High Load | \$7,780,149 | \$7,801,735 | \$21,586 |
| Low Load | \$5,994,755 | \$6,076,238 | \$81,483 |
| High Capital Cost | \$6,984,600 | \$7,022,491 | \$37,891 |
| Regulated CO ₂ | \$7,708,642 | \$7,744,841 | \$36,200 |
| High Fuel with Regulated CO ₂ | \$8,556,917 | \$8,594,522 | \$37,605 |
| High Regulated CO ₂ | \$9,347,371 | \$9,387,259 | \$39,888 |

| Table 6 CPWC Summaries for Scenario 2 – Renewables Expansion Scenario (\$000) | | | |
|---|--|--|--|
| Case | CPWC of Expansion Plan Including Cane Island 4 in 2011 | CPWC of Expansion Plan Without Cane Island 4 in 2011 | CPWC Savings for Expansion Plan with Cane Island 4 in 2011 |
| Reference Case | \$7,159,378 | \$7,193,530 | \$34,153 |
| Regulated CO ₂ | \$7,953,638 | \$7,987,190 | \$33,552 |

| Table 7 CPWC Summaries for Scenario 3 – DSM Expansion Scenario (\$000) | | | |
|--|--|--|--|
| Case | CPWC of Expansion Plan Including Cane Island 4 in 2011 | CPWC of Expansion Plan Without Cane Island 4 in 2011 | CPWC Savings for Expansion Plan with Cane Island 4 in 2011 |
| Reference Case | \$6,856,721 | \$6,909,460 | \$52,739 |
| Regulated CO ₂ | \$7,692,426 | \$7,745,238 | \$52,812 |

| Table 8 CPWC Summaries for Scenario 4 - Renewables and DSM Expansion Scenario (\$000) | | | |
|---|--|--|--|
| Case | CPWC of Expansion Plan Including Cane Island 4 in 2011 | CPWC of Expansion Plan Without Cane Island 4 in 2011 | CPWC Savings for Expansion Plan with Cane Island 4 in 2011 |
| Reference Case | \$7,139,004 | \$7,177,545 | \$38,341 |
| Regulated CO ₂ | \$7,932,282 | \$7,972,993 | \$40,711 |