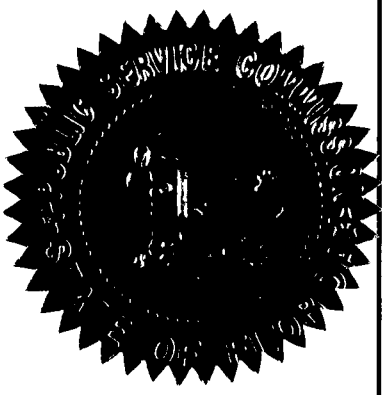
BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 080148-EI

In the Matter of:

PETITION FOR DETERMINATION OF NEED FOR LEVY UNITS 1 AND 2 NUCLEAR POWER PLANTS, BY PROGRESS ENERGY FLORIDA, INC.
_____/



VOLUME 4

Pages 306 through 428

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PROCEEDINGS:	HEARING
BEFORE:	CHAIRMAN MATTHEW M. CARTER, II COMMISSIONER LISA POLAK EDGAR COMMISSIONER KATRINA J. McMURRIAN COMMISSIONER NANCY ARGENZIANO COMMISSIONER NATHAN A. SKOP
DATE:	Thursday, May 22, 2008
PLACE:	Betty Easley Conference Center Room 148 4075 Esplanade Way Tallahassee, Florida
REPORTED BY:	LINDA BOLES, RPR, CRR Official FPSC Reporter (850) 413-6734
APPEARANCES:	(As heretofore noted.)

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P R O C E E D I N G S

(Transcript follows in sequence from Volume 3.)

CHAIRMAN CARTER: Good morning. We are resuming our hearing, and we were at the break and we are ready to call our next witness. You're recognized.

MR. BURNETT: Good morning, sir. We call Robert Niekum.

CHAIRMAN CARTER: Robert Niekum. Did I get it right?

THE WITNESS: Yes.

ROBERT D. NIEKUM

was called as a witness on behalf of Progress Energy Florida and, having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BURNETT:

Q Good morning, Mr. Niekum. Will you please introduce yourself to the Commission and provide your business address.

A My name is Robert Niekum. I'm the Director of Account Management, Origination and Cogeneration for Progress Energy Florida, and my business address is 299 First Avenue North, St. Petersburg, Florida.

Q Mr. Niekum, have you already been sworn as a witness?

A Yes.

Q Have you filed prefiled direct testimony and exhibits in this proceeding?

A Yes.

Q And do you have those with you?

A Yes.

Q Do you have any changes to make to your prefiled testimony or exhibits?

A No, I do not.

Q If I asked you the same questions in your prefiled testimony today, would you give the same answers that are in your prefiled testimony?

A Yes.

MR. BURNETT: Sir, we request that the prefiled testimony be entered into the record as read today.

CHAIRMAN CARTER: The prefiled testimony will be entered into the record as though read.

IN RE: PETITION ON BEHALF OF PROGRESS ENERGY FLORIDA, INC. FOR NUCLEAR NEED

FPSC DOCKET NO. _____

DIRECT TESTIMONY OF ROBERT D. NIEKUM

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. Robert D. Niekum, P.O. Box 14042, St. Petersburg, Florida 33733.

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

A. I am employed by Progress Energy Florida, Inc. ("PEF" or "the Company") as a Director of Account Management, Origination and Cogeneration.

Q: What are your responsibilities as Director of Account Management, Origination and Cogeneration?

A: PEF provides wholesale power to electric cooperatives, municipal utilities and investor owned utilities. PEF buys power from those same organizations as well as from independent power producers, cogenerators and renewable energy suppliers. I have responsibility for all long term contracts for purchases and sales of wholesale electric energy for PEF, including the procurement of cogeneration capacity and renewable energy. This includes administering all of these long term contracts, negotiating extensions, resolving disputes, and administering payments to cogeneration and renewable suppliers. All of the staff dedicated to the procurement of renewable energy report directly to me.

Q. Please describe your education background and professional experience.

A. I received a Bachelor of Science degree in Electrical Engineering from the University of Florida in 1976 and a Master of Engineering degree in Electrical Engineering from the University of Florida in 1982. I have completed executive management programs at Dartmouth College in 1996 and at Duke University in 2002. I am a registered Professional Engineer in the State of Florida.

Prior to my current position, I have had other management positions at Florida Power Corporation as Director of Fuels Supply and Manager of Generation Planning. I have provided testimony to the Florida Public Service Commission ("PSC") on Need Hearings for Hines 1 and on Cogeneration issues. Prior to working at Progress Energy, I worked at the Jacksonville Electric Authority in engineering positions in System Planning and in Residential Load Research.

Q. Are you sponsoring any sections of the Company's Need Study, Exhibit No. ___ (JBC-1)?

A. Yes. I am sponsoring Section IV, C., 5, the "Future Renewable Fuel Generation" subsection of the Need Study.

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits that I prepared or that were prepared under my supervision and control and are accurate to the best of my knowledge:

- Exhibit No. ___ (RDN-1), which is a list of PEF's renewable contracts;

- Exhibit No. ___ (RDN-2), which is a copy of the National Renewable Energy Laboratory's resources maps for wind and solar;
- Exhibit No. ___ (RDN-3), which is a copy of the Florida Public Service Commission and the Department of Environmental Protection's An Assessment of Renewable Electric Generating Technologies for Florida; and
- Exhibit No. ___ (RDN-4), which is a list of potential renewable suppliers who responded to PEF's recent Request for Renewables.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to explain PEF's renewable energy portfolio along with its ongoing efforts to develop and sustain renewable energy resources. I will also discuss total viable and reliable renewable resources that are available now and in the foreseeable future in Florida that might be available to PEF. Finally, I will discuss PEF's ongoing negotiations with potential renewable energy providers and PEF's actions to encourage new renewable projects in Florida.

II. HISTORICAL OVERVIEW OF PROGRESS ENERGY'S RENEWABLE ENERGY PROGRAM

Q. Briefly describe PEF's renewable energy program.

A. PEF's renewable energy programs generally are divided between retail and wholesale. Mr. Masiello will provide testimony on the retail programs. I will discuss the wholesale programs.

On the wholesale side, PEF is actively pursuing contracts with electric energy providers that use renewable resources to produce electric energy on a large scale, usually at least 1 megawatt ("MW") or more. PEF currently has contracts with five providers for more than 173 MW of renewable energy. In addition, PEF has recently signed three contracts for an additional 267 MW of renewable energy. Exhibit No. ____ (RDN-1) shows PEF's current existing and pending contracts.

We have not stopped there, however. In order to be even more proactive in obtaining renewable resources, on July 19, 2007, PEF issued a Request for Renewables to encourage renewable providers to open discussions with the Company on potential new projects in Florida. The intent of this request was to build upon PEF's strong track record of attracting renewable resources with flexible negotiations while staying within the regulatory requirements for cost effectiveness.

Q. When did PEF begin its Wholesale Renewable Energy program?

A. The origins of PEF's renewable energy program began with the Public Utilities Regulatory Policy Act (PURPA) of 1978. By the 1980s, Florida Power Corporation ("FPC") began entering into long-term contracts with cogenerators and municipal solid waste facilities. By the 1990s, FPC had over 800 MW of contracts with qualifying facilities, so-called "QFs." With the creation of Progress Energy in 2000, PEF continued searching for renewable energy projects and ultimately signed three new contracts with two new suppliers and renegotiated contracts with several existing smaller producers. The Company has continued its long-standing practice

of adding renewable energy resources to its generation portfolio throughout this decade.

III. RENEWABLE RESOURCES IN FLORIDA

Q. What sources of energy are considered renewable?

A. Although there is no universal definition of a renewable resource, Section 366.91 of the Florida Statutes ("F.S.") provides one: "electrical energy produced from a method that uses one or more of the following fuels or energy sources: hydrogen produced from sources other than fossil fuels, biomass, solar energy, geothermal energy, wind energy, ocean energy, and hydroelectric power. The term includes the alternative energy resource, waste heat, from sulfuric acid manufacturing operations." The statute also defines municipal solid waste as a type of biomass.

Q. Please discuss the availability of renewable resources in the Florida market.

A. Because renewable resources use natural sources of energy, the market for such resources is driven by the availability of energy that can be obtained from the environment. Florida's geography and weather significantly limit the types of viable renewable energy sources in the state. For example, traditional resources such as hydro power or geothermal sources are essentially unavailable in Florida. Although there is considerable debate about the development of economic solar and wind resources, most research to date indicates that wind and solar power have limited application within PEF's service territory. In Exhibit No. ___ (RDN-2) to my

testimony, I have included national wind and solar resource maps that illustrate this point.

Future options may include some type of ocean wave or current sources, but there are no successful ocean wave or current projects yet in Florida. There is general agreement, however, that Florida does have a modest potential for additional biomass development due to the availability of forest and farmland, and a tropical climate with a long growing season. That potential, however, is dependant upon, among other things, the development of reliable technology, land costs, and local acceptance.

Q. How much renewable capacity currently exists in Florida?

A. In a presentation to the Florida Public Service Commission on August 15, 2007, the Florida Reliability Coordinating Council ("FRCC") stated that there was 1,441 MW of existing renewable energy capacity in Florida. In addition there was 125 MW of biomass, 13 MW of landfill gas, and 88 MW of wood products planned in the 2008 – 2016 timeframe.

IV. EVALUATING RENEWABLE ENERGY RESOURCES

Q. How does PEF evaluate renewable energy resources?

A. Any renewable resource selling electric energy to PEF must be able to meet the minimum standards as described in the Renewable Standard Offer Contract as approved by the PSC. PEF gives consideration to the issues and end use categories specified in Commission Rule 25-17.0021(3), Florida Administrative Code

("F.A.C.") and the renewable criteria established by the legislature in Section 366.91, F.S. Particular items may be negotiated resulting in a negotiated contract, however, the resulting contract must be approved by the PSC as reasonable and prudent.

Some of the key issues that must be evaluated are:

- Does the supplier have a viable technology?
- Is there a fuel supply or energy source that is dependable?
- Can the supplier obtain financing for the project?
- Is there a reasonable business plan in place?

The vast majority of proposals we receive from renewable developers either have no real technology or any viable method to convert an idea into a real project. PEF nonetheless makes every reasonable attempt to hear out unconventional ideas before making any decisions.

Q. How does Progress Energy Florida evaluate the cost effectiveness of renewable energy projects?

A. Projects are evaluated in accordance with the PSC rules for Standard Offer Contracts and Negotiated Contracts. The total Net Present Value of the payments to the renewable resource must be less that the total expected expense of the utility's own generation resources (avoided cost). In this way, the renewable resource must be cost effective when compared to conventional resources. However, benefits of renewable attributes such as Renewable Energy Credits (RECs) are not included in the utility payment and may represent an additional revenue stream for the

renewable resource, as well as any tax credits or other local, state, or federal incentives.

Q. Has PEF been able to contract for renewable resources at or below avoided costs?

A. Yes, PEF has entered into a number of new renewable energy contracts with developers who have been able to develop projects that are profitable at or below these avoided costs.

Q. Is renewable energy more expensive than current energy sources including coal, natural gas, and nuclear energy?

A. The cost of renewable energy varies a great deal depending upon the technology. PEF has recently entered into contracts with the Florida Biomass Energy Group for approximately 117 MW and Biomass Gas & Electric ("BG&E") for another 150 MW. The costs of these contracts are below avoided cost; that is, they are less expensive than the cost of new fossil-fueled generation. On the other hand, our experience with solar photovoltaics has shown that the cost for this type of electric generation is much higher than avoided cost.

In January 2003, the PSC and the Department of Environmental Protection ("DEP") issued An Assessment of Renewable Electric Generating Technologies for Florida that listed levelized costs as low as 2.4 cents per kWh for municipal solid waste facilities to as high as 47.4 cents per kWh for photovoltaics. (Attached hereto as Exhibit No. ____ (RDN-3)). These costs may have changed since the

report was issued, but the range demonstrates the variability of costs for renewable energy and is consistent with what we have seen from developers since 2003.

Q. What is PEF doing to encourage the use of renewable energy?

A. PEF has always been one of the most successful Florida utilities in securing renewable energy contracts. These contracts represent a cooperative process between the developer and the utility in order to bring a project to fruition. PEF has worked on contracts for as long as it takes to get a workable agreement that is satisfactory to all of the parties. The reality is that patient, hard work is often far more effective in achieving positive results than any other action that a utility can take.

Q. Has Progress Energy Florida been able to identify renewable energy sources that appear to be reasonable, feasible, and economic?

A. Yes, this is demonstrated by PEF's recent contracts with the Florida Biomass Energy Group, and BG&E of Florida. Our recent Request for Renewables also demonstrates PEF's continuing desire to enter into power purchase agreements with renewable providers.

Q. Does Progress Energy Florida purchase energy and capacity from any other renewable facilities?

A. Yes. As early as 1980, PEF entered into an agreement to purchase energy from the municipal solid waste ("MSW") facility in Pinellas County, Florida and in 1983,

PEF began purchasing energy from St. Joe Forest Products produced from waste wood. The St. Joe Forest Products facility was shut down a few years ago, but the Pinellas County MSW facility continues to operate reliably and is under contract to deliver to PEF through 2024.

Currently Progress Energy Florida purchases capacity and energy from municipal solid waste facilities in Lake County (12.75 MW), Metro-Dade County (43 MW), Pasco County (23 MW), and Pinellas County (54.75 MW). PEF also purchases capacity and energy produced by waste wood, tires and landfill gas from Ridge Generating Station (39.6 MW). When added to the contracts with the Florida Biomass Energy Group (117 MW) and BG&E of Florida (150 MW) the total capacity of renewable energy under contract to PEF is over 439 MW.

PEF also purchases renewable energy from PCS Phosphate's waste heat fueled facilities and from the SI Group's waste wood facility on an as-available basis. Attached as Exhibit No. ___ (RDN-1) to my testimony is a table showing PEF's current QF and Renewable Energy contracts as well as contracts that are currently under negotiations.

V. SOURCES OF RENEWABLE ENERGY

Q. Can you discuss the potential of hydrogen produced from sources other than fossil fuels in Florida?

A. First, hydrogen is a method to store energy not an energy source. That is, it takes energy to create hydrogen and then the hydrogen can be transported and/or stored until it is ready to be used. Traditionally, hydrogen has been produced from natural

gas. In order to produce hydrogen from renewable resources, a conversion process must be utilized. Currently, the most common conversion method is to electrolyze water thereby splitting water molecules into oxygen and hydrogen. Electrolysis is a very inefficient process, so it takes much more energy to produce the hydrogen than is stored in the hydrogen. Therefore, until newer methods of producing hydrogen are developed, it makes more sense to use renewable resources to produce electricity directly rather than to produce hydrogen that is then going to be used to produce electricity.

Q. What about biomass?

A. Biomass makes sense in Florida depending, in large part, on land prices, technology feasibility, and public acceptance. Florida is blessed with a sub-tropical climate that allows year-round growth of biomass. This is a big advantage compared to the rest of the country outside of south Texas and Hawaii. PEF recognized the potential of biomass in Florida early on and was able to lock up two of the largest biomass facilities in the world.

Q. Can you describe the Florida Biomass Group project?

A. Yes. The Florida Biomass Group, once known as the Biomass Investment Group or BIG, has been assigned to the Innovative Energy Group of Florida, L.L.C. or IEG. This facility is a closed loop project that is expected to produce as much as 145 MW of electricity. They will grow a crop they call E-Grass. They will be able to harvest the E-Grass twice a year from a 20,000 acre farm. The E-Grass will be

converted to a bio-oil using a process called pyrolysis. Simply stated, pyrolysis is a method of burning the E-Grass in an oxygen free environment producing bio-oil and char. The char will be used as fertilizer for the E-Grass. The bio-oil is then used in a traditional combined cycle power plant to produce electricity. This contract is expected to save PEF's ratepayers an estimated $113 million when compared to avoided cost.

Q. You stated that the IEG project is a closed loop project. What does that mean?

A. In this case, closed loop means that the CO_2 from this project is captured in a closed loop. First, as the E-Grass grows, it uses photosynthesis thereby absorbing CO_2 from the atmosphere. The CO_2 is contained in the bio-oil produced by IEG and is released as the bio-oil is burned in the combined cycle facility. All the CO_2 released is then re-captured by the E-Grass as it grows. In other words, the CO_2 just continues to be released and re-captured in a closed loop.

Q. Is IEG considering producing bio-oil from E-Grass grown outside of Florida?

A. Yes. The cost of production may be substantially lower in other farming locations, improving the economic viability of the project. However the closed loop characteristic of the entire process is not changed by separating the distance between the farm and the power plant, which will still be located in Florida.

Q. Please summarize the Biomass Gas & Electric project.

A. The Biomass Gas & Electric group will use a different technology than the IEG E-Grass project. BG&E will use waste wood products such as yard trimmings, tree bark, and wood knots from paper mills. The waste wood products will then be gasified using a process similar to the process used in coal gasification and the gas will be utilized in a combined cycle plant. The two BG&E facilities are expected to produce 75 MW electricity per facility, for a total of 150 MW, which would make them the largest waste wood biomass projects in the nation. These contracts are expected to save PEF's ratepayers an estimated $86 million when compared to avoided cost.

The IEG project and BG&E projects demonstrate why PEF is excited about the potential of biomass in Florida. These projects are expected to deliver reliable, cost effective electric energy to our customers by using technology that is available today.

Q. You mentioned that municipal solid waste is included in the definition of biomass as outlined in F.S. 366.91. What is the potential of additional municipal solid waste as a fuel source in Florida?

A. Municipal Solid Waste or MSW has a proven track record in Florida. For example, PEF has contracts with four MSW fueled facilities totaling 133.5 MW. These facilities are located in Lake County, Metro-Dade County, Pasco County, and Pinellas County. I understand that additional MSW fueled facilities are being considered in Florida. I also understand that there are some new technologies being developed to better utilize MSW as a fuel. While MSW seems certain to continue

to be a resource in Florida, estimates that I have seen suggest that the maximum additional capacity available from MSW fueled facilities is around 400 MW statewide.

Q. Let's go back to the list of defined renewable resources. What is the potential for large-scale solar energy projects in Florida?

A. While the future potential for small photovoltaic devices may be promising in some areas of the country, the technology still has a way to go before photovoltaics are cost effective on a large scale. Unlike biomass projects that can produce electricity at or below avoided costs, photovoltaics are much more expensive. Recent costs show that photovoltaics cost about $0.32 per kWh or about five times the cost of biomass generation. For the immediate future, photovoltaics cannot produce cost-effective or reliable energy in Florida on a large scale basis.

Q. What about the potential for generation from wind powered facilities?

A. With current technology and the current understanding of wind resources in Florida, wind powered generation does not seem to be very promising in Florida. The map from the U.S. Department of Energy and the National Renewable Energy Laboratory (NREL) is attached as Exhibit No. ___ (RDN-2) to my testimony. This map shows that Florida only has marginal wind resources that are along the coastline. There may be sufficient wind resources off shore in Florida, but transmitting energy from off shore sources is, among other things, still very expensive and often impractical.

As windmill and transmission technologies improve, they may unlock the potential of wind in Florida. In the foreseeable future, however, wind powered generation is not economic or feasible in Florida.

Q. The next renewable source listed in F.S. 366.91 is ocean currents. What is the state of ocean current technology?

A. This technology is still in the developmental stage, and there are no successful ocean current technology projects in Florida.

Q. Is there any potential for hydroelectric power in Florida?

A. Very little. Florida is not blessed with the elevation changes required for hydroelectric power. There is a very small amount of hydroelectric power in Florida, but no new viable projects have been found to date.

Q. F.S. 366.91 includes waste heat from sulfuric acid manufacturing as a renewable resource. Is PEF familiar with this technology?

A. Yes. PEF had a contract with Mosaic for 15 MW of capacity and energy produced from the waste heat resulting from the manufacture of sulfuric acid. That contract expired at the end of 2007. Beginning in 2008, Mosaic intends to use that 15 MW to serve its own load. In addition, PEF purchases such waste heat energy on an as-available basis from PCS Phosphate.

As long as there are phosphate mining operations in Florida, the waste heat from sulfuric acid manufacturing should be a viable source of renewable energy.

However, as PEF's contract with Mosaic demonstrates, most of the generation from waste heat will be used by the mines that produce sulfuric acid for their own operations rather than sold to others.

VI. REQUEST FOR RENEWABLES

Q. PEF released a "Request for Renewables" in July. What is a Request for Renewables?

A. It is simply a request for anyone with a project that produces electricity from a renewable resource to come talk with PEF to see if a purchase agreement can be negotiated. It is less restrictive than a formal request for proposals and was PEF's additional attempt to uncover any viable, cost effective renewable project for PEF in Florida. Also included in the Request for Renewables (or "RFR") were requests for information from those that install photovoltaic and solar thermal systems. The solar responses have been forwarded to the DSM and Alternative Energy Group. My department handled the responses seeking to sell all other types of renewable energy to PEF.

Q. How successful has the RFR been?

A. We have received over 55 inquiries about selling renewable energy to PEF. The responses have varied from a group that is proposing to build an underground facility with a technology they are not willing to discuss, to wave energy, solar, biomass, and biodiesel projects. Of these inquiries, 50 were clearly not likely to result in viable contracts by the year 2017. Others, however, may have promise, and

we have entered into more substantive discussions, but it is too early to tell if any of these inquiries will develop into purchase agreements. A table outlining these inquiries and a status of our follow up is attached to my testimony as Exhibit No. ___ (RDN-4).

Q. Why is it too early to tell if these inquiries will become purchase agreements?

A. Many of the inquiries are just looking for information about rate structures, service area, etc. Some of the inquiries are from developers that do not yet have a commercial technology or that have a technology that is not cost effective. Further, there may be interconnection issues, and some projects may have trouble obtaining financing for a variety of reasons.

Q. Based on all the facts and information you have at this time, how much more reliable and cost-effective renewable energy can PEF contract for between now and 2017.

A. The potential for substantial increases in the amount of renewable energy that is reliable and cost-effective is limited. As I have previously discussed, the only new reliable and cost-effective renewable resources that will be available to PEF within this timeframe would almost certainly come from MSW and biomass projects. With only an estimated additional 400 MW of MSW available statewide in the foreseeable future as a best case scenario, this resource has finite limits. Biomass projects are limited due to the significant volume of fuel that they require. Other renewable alternatives such as solar, wind, and wave energy have not yet become

cost-effective, and these technologies are highly dependent upon intermittent natural energy sources that can be a valuable energy resource but cannot be depended upon to produce firm capacity.

Q. Are there any risks for PEF in entering into contracts with new renewable energy projects?

A. Yes. The biggest single risk is that renewable energy producers that PEF enters into contracts with may not bring their projects to fruition. For example, if new renewable projects are not able to secure reliable fuel sources, are not able to reliably put new generation technologies into operation, are unable to secure sites for their projects, and/or are unable to complete their projects due to financial or other logistical constraints, PEF will obviously need other reliable sources available to meet PEF's generation needs.

Another risk is that these technologies may not be capable of the reliability of a fossil-fueled generator. For instance, solar generators can only generate during daylight hours and wind generators can only generate when the wind is blowing. While new renewable energy technologies and projects are exciting and encouraging, there is a real-world chance that some of these projects will never advance to commercial operation or they may not operate as reliably as a fossil-fueled generator, and PEF must be prepared for this contingency.

VII. CONCLUSION

Q. Does this conclude your testimony.

A. Yes it does.

BY MR. BURNETT:

Q Do you have a brief summary?

A Yes. Again, my name is Robert Niekum and I am the Director of Account Management, Origination and Cogeneration for Progress Energy Florida. I have submitted prefiled testimony regarding PEF's renewable energy portfolio, along with its ongoing efforts to develop and sustain renewable energy resources. I'm available to answer questions regarding my prefiled testimony.

MR. BURNETT: Thank you.

We tender Mr. Niekum.

CHAIRMAN CARTER: Thank you.

Mr. Burgess? Mr. Brew?

MR. BREW: No questions.

CHAIRMAN CARTER: Mr. -- staff?

MS. FLEMING: We have no questions.

CHAIRMAN CARTER: Commissioners? Okay. Well, let's wait a couple of seconds.

Mr. Jacobs, we have Mr. Niekum on the stand. Do you have any cross-examination for him?

MR. JACOBS: Just a couple of questions.

CHAIRMAN CARTER: I beg your pardon?

MR. JACOBS: Just a couple of questions for him.

CHAIRMAN CARTER: Okay. You're recognized, sir.

CROSS EXAMINATION

BY MR. JACOBS:

Q Good morning, Mr. Niekum. How are you?

A Good morning.

Q Your testimony has to do with the company's positions on renewables; is that correct?

A Yes.

Q And in your testimony you indicate the effort and the extent to which the company has undertaken to integrate renewables into your generation; is that correct?

A Yes.

Q Is it a fair statement that your programs have been tied to the idea that your customers would also engage in load management as, in addition to undertaking renewables? Is that, is that a fair statement?

A Well, the renewables that I am responsible for obtaining are on the -- we get on the wholesale level. They're generally large-scale renewable resources. The issues with load management would be direct load control, all those programs Mr. Masiello testified to. So to the degree that the two integrate together, it's part of the overall process of planning the system. But what I do generally is not directly tied at all to the DSM program.

Q Help me understand then. So you're only dealing with renewables contracts, RFPs that come out of the new Commission rule then?

A Yes.

Q Okay. And so to the extent that a residential customer who wants to engage, take solar, you wouldn't be involved in that?

A No, I would not, because generally those are smaller units that are either part of some solar program or would fall under the net metering rules when they come into effect. Those are usually not done with a PPA.

Q What about commercial customers or industrial customers?

A Up until they hit the limits of the net metering it would really depend on what they wanted to do. If a commercial customer was putting in a large scale solar, say, of three or four megawatts or any type of renewable program, then they may come to us and ask for a power purchase agreement and sell that power directly to us. But if they were offsetting some of their own load with that solar program, then I wouldn't be involved in that.

Q Could you describe the level and extent to which you, you or your, your organization has done a market analysis or survey which, which explores the, the potential, if you will, of available generation, let's stick with solar, available generation from solar and match that up to the, to your RFPs that you have issued? In other words, have you gone and looked at what the market provides or offers with regard to space and

potential facility and matched that up to your RFPs?

MR. BURNETT: Excuse me. I'll object as compound, confusing.

CHAIRMAN CARTER: Rephrase. Rephrase, Mr. Jacobs.

MR. JACOBS: I thought it was fairly straightforward.

BY MR. JACOBS:

Q In designing your RFPs, what is your, what is your market analysis that goes into that?

A Last year, if I -- last year we went, put a request for renewables out that in effect was a little broader than an RFP. We basically tried to cast a wider net of looking at anybody that could produce some type of renewable energy that would be something that we would find useful.

When you do something like that, you get quite a wide variety of responses, some of which are really not feasible at all. Sometimes people just have some ideas but no real project.

But within all those responses there were several that had real potential and we have signed one contract. The second biomass gas and electric contract kind of fell under that, that net. And then we've uncovered a number of others that we are in negotiations with. So we have tried to find in as creative a way as we can what resources are out there, and so we have been looking for those resources.

Q Are you -- in the petition for need, you're familiar

that you include as an attachment the Commission's report on renewables; is that correct?

A That's right.

Q And in that report there is an assessment of the market for renewables particularly with regard to solar. Are you familiar with that analysis?

A Yes.

Q And that analysis provides that because a lot of the load in Florida is driven by air conditioning, that, and because air conditioning occurs at a point in time during the day when solar would generate, that air conditioning would appear to be a good fit for solar renewables. Is that, is that a fair statement as to the Commission's report?

MR. BURNETT: I'm sorry. Do you have the page number you're referring to, sir?

MR. JACOBS: I will be happy to pull that up. It will take me a few minutes, Chairman, Mr. Chairman. It's in their, it's in their petition. I would hope they would have that.

CHAIRMAN CARTER: Well, wait. Wait. Wait. Wait. Let's hold on now. Let's hold on.

You can ask your question -- you can ask a question based upon whether or not he has any knowledge. If he doesn't have any knowledge of it, then, you know, you can go find it. So, let's --

MR. JACOBS: Then, sir, if you'll give me about two minutes, I'll pull and get him a page reference.

CHAIRMAN CARTER: Okay. You've got two minutes.

MR. JACOBS: Thank you.

CHAIRMAN CARTER: Let's take about a five-minute recess.

(Recess taken.)

We are back on the record.

Mr. Jacobs, you're recognized, sir.

MR. JACOBS: Thank you, Mr. Chairman.

BY MR. JACOBS:

Q Mr. Niekum, I'm actually going to point you to your testimony and what's been identified as Exhibit 25, RDN-3. Do you have that?

A Yes, I do.

Q And I'm going to Page 31 of 81 of that exhibit.

A I'm sorry. I didn't hear the page number.

Q I'm sorry. Page 36, page 36 of 81 of Exhibit 25, which is RDN-3 attached to your testimony.

A Okay. Page thirty -- oh. Okay. I have it.

Q Okay. And you see the section there labeled "Solar Potential"?

A Yes.

Q Okay. And I assume that, that you've reviewed this, this, this section of the report.

A Yes.

Q Is it, is it a correct conclusion that the conclusion reached here is that solar is a good fit for peak, for reduction of peak demand?

A This chart would tell you that the data that I've seen for our utility says that it is not. The photovoltaic generation curve you see here is one probably more typical of a very high solar area, and it's probably -- for summer our load does not really follow this curve from all the data I've seen. Our peaks tend to occur much later in the day. And so this is not a representation of any load data I've seen for Progress Energy Florida.

Q Okay. And you've presented -- in your, in your petition, in your assessment of renewables you represented that distinction that, that renewables are more suited to your system because of how your peaks occur?

A Well, we try to find renewable resources that will help be available at the time a system peaks so that they could be considered as part of our resource plan. If a renewable resource generates power either randomly or at times that are not really consistent with any of our peaks, then the resource really could be an energy resource and we could, we could purchase that power on an as-available basis but not as firm capacity.

Q And do you, do you engage in that policy or is that a

practice that you look to?

A Yes, we do.

Q So to what extent do you buy energy from solar resources?

A Right now all of our -- we're not buying any large scale solar. We're currently in negotiations with several developers that are looking at large scale solar, but we currently do not have a PPA contract with any of them.

Q Are you familiar with the recent trend of, where third party financiers are engaging commercial establishments, i.e. Wal-Mart, Costco, where they are buying their roof space in order to install systems?

A I'm only vaguely familiar with that. It's not something that I normally deal with.

Q I thought you, you would be dealing -- oh, I see. So in the event that -- let me walk, just walk through that for a moment.

So if, if a large commercial customer were to come to you in partnership with a, a financing company from Wall Street and said, "We engaged in an arrangement where this financing company is going to buy our roof space, install solar and generate electricity," that, that would, you would not be involved in that transaction to the company?

A It would be highly dependent on how ultimately it was structured. There are different ways that can be done. Right

now we have not engaged in any contracts like that.

Q Okay.

A Again, these can sometimes be done on an individual basis where they come in and put those units in, and that would be more on the retail side. Mr. Masiello would deal with those type of arrangements.

The contracts that I have worked on have all been more like a generating station type or a freestanding solar facility that we would interconnect to. So I haven't had any experience with that arrangement.

And generally the arrangements that we do financially with those, those kind of arrangements are more on the retail side than the wholesale PPAs that I would deal with.

MR. JACOBS: Very well. Thank you. No further questions.

CHAIRMAN CARTER: Thank you. Commissioners? Commissioner Argenziano.

COMMISSIONER ARGENZIANO: And, Mr. Chair, I'm not sure if Mr. Niekum can answer these questions and I'm just going to ask. Because yesterday I was asking Mr. Masiello and, about some solar issues, and I think what he answered me yesterday was more about the nuclear power plant, which I believe is baseload, and I was really asking, I think, more about peak load. So if you can't answer the questions, then -- you know, I'd just appreciate it if you can. If you can't,

then maybe the company can help provide me with some of that information maybe in the form of a late-filed amendment or whatever needs to be done.

So in saying that, I guess I wanted to know a few things because of the questions that come in from citizens out there and some of the things that just come up during, I guess, thinking about the issues before us.

What percentage of electric do you think is used from water heaters in people's homes?

THE WITNESS: I, I used to work on that years ago, and I would be -- I would feel wrong to give you an estimate of what that is. But it is a substantial portion of many residential bills, particularly if they are smaller homes and you have in particular teenagers or children.

COMMISSIONER ARGENZIANO: Right. A larger family.

THE WITNESS: And so water heating can be a substantial part of that bill.

COMMISSIONER ARGENZIANO: And that's part of -- whoa. And that's part of baseload?

THE WITNESS: No. Water heating tends to be pretty much, you know, in the evening and morning. You know, again, people have different lifestyles. But, again, this is from my experience many years ago doing load research on this, and it tends not to be baseload as much as it is pretty much lifestyle, morning and evening.

COMMISSIONER ARGENZIANO: Okay. Okay. And I don't know, I don't have any clue about what a solar water heater would cost. Do you have any idea?

THE WITNESS: No.

COMMISSIONER ARGENZIANO: I know that's a stretch, but just in case you do, I'm --

THE WITNESS: No, I don't. I really don't.

COMMISSIONER ARGENZIANO: Okay. Okay. And, well, I guess what I'm trying to figure out, and I know this is going to sound simplistic or a little odd, but for my own reasons I'm trying to figure out how many of these water heaters of the 17 million, billion dollars, you know, how many of them would offset the baseload demand? Does that make sense?

THE WITNESS: I understand what you're saying. And I think particularly when you look at solar energy, it tends to be only available for the sunlight hours. So you get maybe five really good hours, maybe six, just depending on the season of when the energy is produced. Then the question is what do you do with that energy and how do you make the best use of it? This is where solar fits in rather well as a peaking supply depending on the technology.

Now the advantage of solar water heating is, of course, you're storing the energy and you're using it during those peak times that you'd have normally used electricity. So that has a value.

We're currently looking at some of the thermal solar generation on the large scale that has some type of heat storage mechanism that allows the solar energy to be moved a few hours so that you can generate power closer to the utility system peak. That greatly increases its value.

The problem still with solar is it's very expensive. But to the degree you can align it with the most expensive times you're using electricity anyway or running your most inefficient units, it has real value. It just doesn't tend to reduce baseload. It tends to reduce these peaking applications and that tends to be where, in my opinion, it fits the best.

COMMISSIONER ARGENZIANO: So if I may.

CHAIRMAN CARTER: You're recognized.

COMMISSIONER ARGENZIANO: So if you were using a solar water heater, I guess your water heater holds hot water for I don't know how many hours but there's a number of hours. So even if it's an offpeak period of time, wouldn't that then be baseload time?

THE WITNESS: Again, it's -- the answer is no. I'm trying to think of a way to explain it.

COMMISSIONER ARGENZIANO: Okay.

THE WITNESS: The -- if you charge up the water heater during the day to store the heat, the chances are most of that water heating consumption occurs at one of the peak times, morning or evening. Different methods have been tried.

When we used DSM for water heater control, we charge it up with baseload at night so that we'd avoid the peaking. And in this case you're just substituting solar energy to do the same job. But in either case it eliminates the need for peaking capacity. It doesn't eliminate the need for baseload capacity.

COMMISSIONER ARGENZIANO: Baseload. Okay. I guess, Mr. Chair, what I'm trying to figure out is if you were to take $17 billion and put it into solar water heating, and I'm not saying -- that's some of the questions that come in -- how much would that remove off the baseload or the peak load, you know, which way it would go? And that's basically if you could give me some information. Plus what I just heard Mr. Niekum say would help in my answers that, that -- the questions that are coming up. That would be helpful, if you could.

MR. BURNETT: Yes, ma'am. And, Commissioner, I think Mr. Crisp may be able to give you even more information on this as well when he comes up.

COMMISSIONER ARGENZIANO: Okay. Great. Thank you. I appreciate that.

CHAIRMAN CARTER: Commissioners, anything further?

Okay. Mr. Burnett.

MR. BURNETT: Nothing further, sir. We'd move his testimony and Exhibits 23 through 26 into evidence.

CHAIRMAN CARTER: Exhibits, Commissioners, marked for identification as 23 through 26. Any objections? Without

objection, show it done.

(Exhibits 23 through 26 admitted into the record.)

Now is Mr. Niekum coming back or --

MR. BURNETT: No, sir. If you're done with him, may he be dismissed?

CHAIRMAN CARTER: You're excused, sir. You can call your next witness.

Well, let's do this. Hang on. Ms. Fleming, would this be the appropriate time -- I know that there's a stipulation on Weintraub and Siphers. Are there exhibits relating to those witnesses? Should we --

MS. FLEMING: Yes, Commissioner. I would suggest that at this point we move in the prefiled testimony of Witness Weintraub as though read.

CHAIRMAN CARTER: Okay. Any objections? Without objection, show it done.

MS. FLEMING: And move in Witness Weintraub's Exhibits 27 through 35.

CHAIRMAN CARTER: Exhibits 27 through 35 on your list, Commissioners. Without objection, show it done.

(Exhibits 27 through 35 admitted into the record.)

MS. FLEMING: And as for Witness Siphers, I would suggest that we move Witness Siphers' testimony into the record as though read.

CHAIRMAN CARTER: Without objection, show it done.

MS. FLEMING: And Witness Siphers has Exhibits 36 through 39.

CHAIRMAN CARTER: Exhibits 36 through 39 for Witness Siphers, any objection? Without objection, show it done.

(Exhibits 36 through 39 admitted into the record.)

IN RE: PETITION FOR DETERMINATION OF NEED FOR LEVY UNITS 1 AND 2 NUCLEAR POWER PLANTS

FPSC DOCKET NO. _____

DIRECT TESTIMONY OF SASHA WEINTRAUB

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Sasha A. J. Weintraub. My business address is 410 South Wilmington Street, Raleigh, North Carolina, 27601.

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

A. I am employed by Progress Energy Carolinas, Inc. ("PEC") as the Executive Director of Regulated Fuels Department.

Q. What are your duties and responsibilities in that position?

A. I am responsible for the procurement of coal, natural gas, and fuel oil for the Progress Energy Florida, Inc. ("PEF" or the "Company") and PEC generation fleet. This includes fossil fuel steam, natural gas combined cycle ("CC"), and natural gas and oil combustion turbine ("CT") generation units. I am also responsible for the Company's coal, natural gas, and fuel oil price forecasts used for resource planning purposes and in connection with the Company's Ten Year Site Plan filing each year.

Q. Please describe your educational background and professional experience.

A. I have a Bachelor of Science ("BS") degree in Engineering from Rensselaer Polytechnic Institute, I have a Master's in Mechanical Engineering from Columbia University, and I have a Ph.D. in Industrial Engineering from North Carolina State University. From February of 2003 until June of 2005 I was the Director of Coal Marketing and Trading for Progress Fuels Corporation, a former subsidiary of Progress Energy. Before assuming my current position as the Executive Director of the Regulated Fuels Department, I was the Director of Coal Procurement for PEF and PEC.

II. PURPOSE AND SUMMARY OF DIRECT TESTIMONY

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

A. The purpose of my testimony is to present and explain: 1) the Company's current fuel forecast for each fuel resource type; 2) the cost differences between the fuel resources the Company uses and explain why price differences between fuel resources are expected in the future when Levy Units 1 and 2 begin commercial operation; 3) the Company's mid-level, low, and high fuel forecasts, explain how they were developed, and discuss the expected behavior in natural gas and fuel oil prices; and 4) the natural gas related supply and demand trends that will face the United States and the State of Florida as their dependence continues to grow on natural gas to meet power generation growth. This testimony will illustrate the fuel cost and fuel diversity benefits that the addition of nuclear generation will provide to PEF, the State of Florida, and its customers over the long term.

Q. Are you sponsoring any sections of the Company's Need Study, Exhibit No. ___ (JBC-1)?

A. Yes, I am sponsoring Section IV. C.3, which deals with the Company's fuel forecasts and explains how they were developed for use in the Company's integrated resource planning process.

Q. Are you sponsoring any exhibits to your testimony?

A. Yes, I am sponsoring the following exhibits to my testimony:

- Exhibit No. ____ (SAW-1), PEF's current energy produced from generation and PEF's estimated energy produced from generation with and without Levy Units 1 and 2 in 2018;
- Exhibit No. ___ (SAW-2), a comparison of fuel variability and weighted average fuel costs;
- Exhibit No. ____ (SAW-3), PEF's forecast for all primary fuel sources (nuclear fuel, natural gas, fuel oil, and coal);
- Exhibit No. ___ (SAW-4), PEF's mid-level, low, and high natural gas fuel forecasts;
- Exhibit No. ___ (SAW-5), PEF's historic natural gas prices from 1998 to November 2007;
- Exhibit No. ___ (SAW-6), PEF's and Florida Power & Light Company's ("FPL") historic natural gas prices from 1990 to 2007 and 1998 to 2008, respectively;

- Exhibit No. ___ (SAW-7), United States Natural Gas Rig Count Versus Natural Gas Well Production since 2002 from the U.S. Energy Information Agency ("EIA");
- Exhibit No. ____ (SAW-8), U.S. Natural Gas Supply Challenge, 2005 to 2030, chart from Department of Energy ("DOE") 2007 Annual Energy Outlook information; and
- Exhibit No. ___ (SAW-9), a chart of the world natural gas reserves by geographic region as of January 1, 2007 from the "Worldwide Look at Reserves and Production" in the Oil & Gas Journal.

Each of these exhibits, except Exhibit No. ____ (SAW-7), Exhibit No. ___ (SAW-8), and Exhibit No. ___ (SAW-9), was prepared under my direction, and each exhibit is correct to the best of my knowledge. Exhibit Nos. ____ (SAW-7), ___ (SAW-8), ____ (SAW-9) were drawn from recognized industry resources that are used by me and the Company in the normal course of business.

Q. Please summarize your testimony.

A. The Company's long-term mid-level spot fuel price forecasts that are used for long-term resource planning are based on a structured approach utilizing information from recognized industry experts and our internal expertise and experience. In addition, because fuel prices are inherently difficult to predict over the short and long-term due to the number of factors that can influence prices, the Company in its low and high fuel price forecasts has established statistical ranges of possible price outcomes to illustrate the potential behavior in fuel prices, with an emphasis on natural gas. The

Company currently has a diverse generation mix and proposes to maintain a significant amount of diversity in the future with the addition of Levy Units 1 and 2. The Company believes that natural gas generation is an important part of the generation mix but that the continued dependence on natural gas generation to support demand growth exposes the customers of the State of Florida to greater fuel price fluctuations and uncertainty, as well as the possibility of severe price swings caused by weather related events. The Company believes the addition of Levy Units 1 and 2 is a critical step to diversify the generation and fuel portfolio for its customers and the State of Florida. Lastly, the addition of Levy Units 1 and 2 will provide environmental benefits, fuel diversification benefits, and long-term fuel savings to customers.

III. PEF'S CURRENT FUEL MIX

Q. What is PEF's current and projected fuel mix for the generation of energy for customers when the commercial operation of Levy Units 1 and 2 begins?

A. PEF's current and proposed future fuel and generation mix offers a significant amount of diversity that includes nuclear fuel (processed, enriched uranium), natural gas, fuel oil, coal, and renewable fuel resources. Nuclear fuel currently represents approximately 14 percent of PEF's current energy generation. Natural gas, fuel oil, coal, and renewable energy account for approximately 30 percent, 10 percent, 43 percent, and 3 percent, respectively. This is demonstrated by the first chart in Exhibit No. ___ (SAW-1). Based on projections assuming Levy Units 1 and 2 begin commercial operation in the summers of 2016 and 2017, respectively, natural gas is

expected to contribute approximately 36 percent of the total energy produced from PEF's generation facilities by 2018. This information is summarized in the second chart in Exhibit No. ___ (SAW-1), which shows the estimated energy produced from generation in 2018 with Levy Units 1 and 2.

Q. What would PEF's projected fuel mix be assuming Levy Units 1 and 2 are not added and the Units are replaced with natural gas?

A. Assuming Levy Units 1 and 2 are replaced with natural gas combined cycle units in the summer of 2016 and 2017, respectively, natural gas will contribute approximately 56 percent of the total energy produced from PEF's generation facilities in 2018. This information is summarized in the third chart in Exhibit No. _____ (SAW-1), which shows the estimated energy produced from generation without Levy Units 1 and 2 in 2018. As is clearly evident, without the addition of Levy Units 1 and 2, PEF, its customers, and the State of Florida will be more susceptible to natural gas price fluctuation and uncertainty, and will have a less diverse fuel mix.

Q. What is diversity and why is it important?

A. Diversity can be defined simply as a generation fleet that is comprised of multiple fuel types and is not overly dependent on any one fuel type. Diversity is important because it improves overall system reliability and reduces the exposure the customer has to the price behavior of any one fuel type. In reviewing the current generation mix and the projected generation mix for the State of Florida in 2016, the state is becoming extremely dependent on natural gas to meet its growing needs. This in diversity terms

means the customers in the State of Florida are becoming less fuel diverse and by virtue of becoming more dependent on a particular fuel type, which in this case is natural gas, are more susceptible to the price uncertainty and volatility associated with natural gas for a larger and growing portion of their electric needs. As the exposure to any one fuel type increases, the reliability of the overall electric system can be impacted.

Q. Are all fuels subject to price volatility?

A. Yes. Various factors, including but not limited to, global demand growth, supply and demand balances, and world-wide market conditions, can impact one or both of the cost components of the fuel, leading to volatility in the total fuel cost to the customer. Historically, the costs of certain fuels have been more volatile than others. Fuel oil and natural gas have been more volatile than coal. Nuclear fuel has historically been the most stable and lowest cost fuel to the customer. As a result, the cost to produce the same amount of electrical energy with nuclear fuel is far less than the cost of other competing and available fuel sources. This is one of the reasons nuclear fuel generation is an attractive option for providing customers low cost energy production relative to other competing fuels.

Q. Is this relationship between nuclear fuel and other fuels in terms of the cost to produce energy expected to continue in the future?

A. Yes. Both on a short-term and long-term basis, nuclear fuel will be the lowest cost fuel source available to PEF to produce energy for its customers. Based on the

Company's fuel forecasts, nuclear fuel is an attractive and viable future option for the generation of energy to meet future customer energy demands.

Q. Is there some way to quantify the value of fuel diversity and, in particular, the value of a diverse fuel portfolio that includes more of the less volatile fuel resources?

A. One way to measure the potential variability of a portfolio's fuel costs is by calculating the standard deviation of the costs of the fuel portfolio. The standard deviation is a measurement of how far away from the expected costs that the actual costs are likely to deviate. In simple terms, the greater the standard deviation of a portfolio, the more potential variability there could be in the actual, future fuel costs.

As an illustration of the potential volatility of different fuel portfolios, Exhibit No. ___ (SAW-2) visually demonstrates the impact of this potential variability in actual costs from expected costs between the individual fuel resources that make up potential utility fuel portfolios and between two fuel portfolios of individual fuel resources. Portfolio 1 in Exhibit No. ___ (SAW-2) is illustrative of PEF's estimated fuel mix with the addition of the planned nuclear generation units in Levy County and Portfolio 2 is illustrative of PEF's estimated fuel mix assuming additional gas generation is added instead of the planned nuclear generation in Levy County.

As you can see from the first chart, uranium which is the source for nuclear fuel has the lowest average fuel cost on a $/MWh basis and also the lowest uncertainty surrounding the future deviation of nuclear fuel costs from that average fuel cost. The individual fuels then progress in order of lowest average fuel cost and the least

uncertainty surrounding the deviation of future costs from the average fuel cost from uranium to coal, gas, and then oil. Gas and oil have higher relative average fuel costs and greater uncertainty surrounding their future costs and, thus, the greatest potential deviation of future fuel costs from their weighted average fuel cost.

A portfolio of utility fuel resources is impacted by the relationship between the weighted average fuel costs and the uncertainty of future fuel costs as the individual fuels may fluctuate together. Both Portfolio 1 and Portfolio 2 represent generation fleets with multiple fuel sources; however, Portfolio 1 would be considered more diverse and better balanced because Portfolio 1 has a higher percentage of the lower weighted average cost and more stable fuel cost fuels in the Portfolio than Portfolio 2. As a result, Portfolio 1 will likely experience less overall cost volatility under any range of future outcomes. Portfolio 2 is more heavily weighted to one fuel and, thus, is not as diverse or well balanced as Portfolio 1. Portfolio 2 carries greater risk and will experience more overall fuel cost volatility than Portfolio 1. In addition, Portfolio 1 will yield a lower expected fuel cost than Portfolio 2. These potential portfolio cost impacts are visually demonstrated in the second chart of Exhibit No. ___ (SAW-2) where Portfolio 1 starts with an expected weighted average fuel cost of just above $40/MWh and is expected to deviate from a low of around $25/MWh to a high of just over $60/MWh, a range of about $35/MWh. Conversely, Portfolio 2 starts at a higher expected weighted average fuel cost of about $60/MWh and ranges from a low of under $40/MWh to a high of almost $90/MWh, or a range of about $50/MWh.

Although it may be obvious, an important step to reducing the risk in fuel cost deviations is to diversify the generation fleet. Diversification is akin to "not putting all

your eggs in one basket" and becoming, as a result, overly dependent on one fuel for energy generation. This diversification is similar to a balanced retirement portfolio that has a varied mix of funds with further mixes of stocks and bonds compared to one that relies solely on a single stock or a few individual stocks. The former is more stable and less risky than the latter. Adding additional nuclear generation to PEF's generation system provides PEF with more fuel resources that are more stable in cost and, thus, provides PEF with a more balanced future fuel portfolio for PEF and its customers.

IV. PEF'S FUEL FORECASTS

Q. What is the Company's fuel forecast for its primary fuel sources?

A. The Company's current fuel forecast is included in Exhibit No. ___ (SAW-3). This shows the forecasted total fuel cost per MMBtu to PEF's customers for nuclear fuel, natural gas, fuel oil, and coal. As you can see, the relative forecasted fuel cost of nuclear fuel is well below the forecasted fuel costs for natural gas, fuel oil, and coal.

Q. How is the Company's fuel forecast developed?

A. As explained in our Ten Year Site Plan filing, the mid-level fuel price forecast is developed using short-term and long-term spot market price projections from industry-recognized sources. For example, in the short term, the mid-level cost for coal is based on existing contracts and spot market coal prices and transportation arrangements between PEF and its various suppliers. For the longer term, the prices are based on spot market forecasts reflective of expected market conditions. Fuel oil

and natural gas price forecasts are estimated based on current and expected contracts and spot purchase arrangements as well as near-term and long-term commodity price spot forecasts. Fuel oil and natural gas commodity prices are driven primarily by open market forces of supply and demand. Natural gas firm transportation costs used in the forecast were determined primarily by pipeline tariff rates, negotiated term contracts and estimated rates for future pipeline capacity that will be needed to meet generation growth.

Based on the Company's fuel forecast, nuclear fuel and coal prices are expected to be less volatile and more stable month to month. Fuel oil and natural gas prices are expected to be more volatile on a day-to-day, month-to-month, and year-to-year basis.

Q. With respect to the fuel forecast in the Ten Year Site Plan, what is a short and long term forecast?

A. The Company's Ten Year Site Plan looks at a ten year period of time for resource planning and fuel forecast purposes. A short term forecast is typically developed for a three year period, and a long term forecast is developed for periods beyond three years. For purposes of the resource plan in PEF's current Ten Year Site Plan, the next projected generation unit that is fueled by nuclear fuel is planned in the summer of 2016, which is at the end of the resource planning process in the Company's last Ten Year Site Plan filed in April 2007. To evaluate the addition of Levy Unit 1 and 2 in the summer of 2016 and the summer of 2017, respectively, the Company evaluated Levy Units 1 and 2 against other resource options over a much longer period of time,

which extended more than forty years beyond the current Ten Year Site Plan. This required the use of fuel price forecasts over this extended period of time.

Q. How did the Company develop the long-term fuel forecasts used to evaluate Levy Units 1 and 2 as generation resource options in 2016 and 2017?

A. For these extended fuel forecasts PEF relied on long-term spot fuel forecast analyses from two separate, independent experts in the field of fuel and energy market evaluations. These independent experts are PIRA Energy Group ("PIRA") and Global Insight, Inc. Both PIRA and Global Insight are industry-recognized experts in fuel forecasts and the analysis of energy markets.

PIRA is an international energy consulting firm specializing in global energy market analysis and intelligence. PIRA provides evaluations of key United States and international energy fundamentals and issues that impact the behavior and performance of the energy industry and its various markets and sectors. This evaluation includes long-term global energy market analyses. PIRA is retained by nearly 500 companies in 51 countries, including 22 out of the top 25 largest oil and gas companies in the United States, clients representing 87 percent of the worldwide natural gas production, and 19 of the top 25 gas and electric utilities.

Global Insight employs over 325 professional analysts, researchers, and economists to provide comprehensive economic forecasting and other financial and economic services to over 3,800 clients worldwide. This includes analyzing forces that shape global demand, supply, and prices for oil, natural gas, coal, and electricity,

including providing fuel price forecasting services for clients including power utilities, energy policy makers, and regulatory bodies.

The spot price forecasts from these experts are rooted in fundamental supply and demand analysis. These experts consider various factors including, but not limited to, supply drivers such as the new sources of natural gas and oil supply, rates of decline of existing sources, costs associated with finding new natural gas and oil, the costs of new technologies, relationships between commodity prices, world wide natural gas demand growth in developing economies, and liquidified natural gas ("LNG") assumptions for both world wide liquefaction and regasification capabilities. On the demand side, these experts look at all of the consumption trends including industrial demand, residential/commercial demand, electric generation demand and Gross Domestic Product ("GDP") growth rates. Lastly, the experts consider geopolitical trends, environmental policies, and generation resources that are expected to be added in the future.

PEF's mid-level spot fuel oil and natural gas forecast is the average of the forecasts provided by PIRA and Global Insights. PEF employs individuals experienced in the natural gas markets who worked with the PIRA and Global Insight information to prepare the Company's long term spot price forecasts. These forecasts are included in Exhibit No. ___ (SAW-3), and in the mid-level natural gas forecast in Exhibit No. ___ (SAW-4), to my testimony. The Company uses the mid-level natural gas forecast to prepare the low and high natural gas forecasts in Exhibit No. ___ (SAW-4).

Q. How does the Company determine its low and high natural gas forecasts?

A. The Company's mid-level natural gas price forecast is considered the most likely scenario based on the Company's view and the independent expertise of the outside companies who provided the information used by PEF in preparing the mid-level fuel forecast. The Company's high and low natural gas price forecasts are developed based on a statistical analysis of the mid-level forecast, whereby the high forecast represents the 90th percentile and the low forecast represents the 10th percentile on a price distribution curve. In other words, prices are expected to be lower than the high forecast and higher than the low forecast with 90 percent statistical certainty. As a result, the low, mid-level, and high natural gas cases in Exhibit No. __ (SAW-4) represent, in the Company's view, the reasonable range of potential future spot fuel costs.

Q. Why have you emphasized the natural gas fuel forecast in your exhibits to your testimony?

A. As explained in the April 2007 Ten Year Site Plan, the differential between natural gas and nuclear fuel prices is a key driver in the selection of the Company's future generation options. For illustrative purposes, if it is assumed price is the only factor considered in making alternative generation choices, as the differential between the expected natural gas and nuclear fuel prices becomes smaller, the economics would favor natural gas-fired combined cycle generation versus nuclear generation. The higher the price differential, the more cost-effective nuclear generation is relative to other generation alternatives. Thus, the price of natural gas can have a significant

impact on the economics of future supply-side generation alternatives. In evaluating natural gas, PEF believes natural gas is a viable, economic fuel source for its diverse generation mix now and in the future. However, PEF believes natural gas will continue to be a volatile commodity in the future, and continue to experience a high degree of price fluctuation, because continued growth will expose the Company and its customers to greater commodity price risk as the gas component of its fuel portfolio continues to grow to meet the needs of its customers and the United States becomes more dependent on foreign sources of natural gas supply. As outlined earlier in my testimony, without the addition of Levy Units 1 and 2, PEF's expected energy generated from natural gas would grow at an even faster rate and become an even larger component of its generation output.

V. FUEL DIVERSITY AND SUPPLY RELIABILITY

Q. Can you explain what you mean when you say that gas will continue to be volatile and experience a high degree of price fluctuation?

A. Yes. As you can see from Exhibit No. ___ (SAW-4), the range of forecasted natural gas prices from 2016, when Levy Unit 1 is expected to commence operation, is from a low of around $6/mmBtu at the lowest point of the low forecast, to a high of around $13/mmBtu in the high natural gas forecast. From there, the low, mid-level, and high gas forecasted prices gradually increase over time, reflecting future fluctuating natural gas prices from 2016 and beyond around a mid-point somewhere between $8/mmBtu and $12/mmBtu.

This is a different range of fluctuation from PEF's past natural gas projections, as demonstrated in Exhibit No. ___ (SAW-5), which plots PEF's reported natural gas prices from 1998 to the end of 2007. As can be seen there, natural gas prices have gradually escalated and are now expected to fluctuate around a higher level, as the costs associated with finding and producing gas have shifted higher. This experience is not unique to PEF's natural gas forecasts and in fact, historical experience shows this is occurring with other Florida utilities. Exhibit No. ___ (SAW-6) tracks the historical delivered natural gas prices for FPL and PEF from January 1990 through July 2007, and 1998 through 2007, respectively. There, you can see that natural gas price fluctuations have moved from a range of around $2/mmBtu to $4/mmBtu in the 1990's to a much higher range of price fluctuations in the 2000's.

PEF (and other Florida utilities) must accept that natural gas prices in the future will likely never return to the beneficial prices of the 1990's that contributed to a rapid increase in the development and commercial operation of advanced, natural gas-fired combined cycle generation plants across the country and in Florida. While this shift in natural gas prices does not eliminate natural gas as a current and future fuel source for electrical energy generation, it does suggest that another generation alternative in the future, like nuclear generation, is a necessary and attractive long-term economic generation alternative to ensure fuel diversity and security.

Q. What are the reasons for this shift in the natural gas prices to a higher range of price fluctuations in the future?

A. There are several key reasons for this and the impacts can be expected to be varied. This is exactly the kind of economic analysis that we look at internally in preparing our fuel forecasts, and that we rely on independent economic and fuel experts like PIRA and Global Insights to provide. One factor, of course, is the proliferation of natural gas as a source of electrical energy generation over the past decade. There simply is a much greater demand for natural gas today, and that demand will continue to grow in the future from electrical energy generation and other uses. While the natural gas supply has increased in response to demand growth, it has generally lagged behind which has put upward pressure on prices. Further, incremental natural gas supply production from the lower 48 states in the future is expected to come primarily from higher-cost onshore, non-conventional sources (e.g. shale, tight sands, coal-bed methane) and deep water offshore projects as shallow-water natural gas production continues to decline and a large portion of the onshore lower 48 conventional natural gas has been discovered. This domestic production likely will not add significantly to the supply of natural gas available for electric generation. As shown by Exhibit No. ___ (SAW-7), even though the number of wells and thus drilling in the United States has more than doubled since 2002, the overall production of natural gas for use has remained relatively flat.

In addition, LNG and other potential Frontier Gas (i.e. Alaskan production) are expected to play an increasing role in balancing the U.S. natural gas portfolio in the future. The overall ability of the United States to import these new sources will depend on the availability of import infrastructure such as port facilities and terminals for LNG and the development of long-haul pipeline projects for Frontier Gas such as

the Alaskan Gas Pipeline Project. In addition, additional pipeline delivery capabilities will be needed in the United States consuming markets to be able to access these potential new supply sources and compete with the global market. The overall supply and demand for LNG as a natural gas supply will also be impacted by changes in the exports and imports of natural gas by United States' neighbors, Canada and Mexico, which can influence the amount of gas supply available to the United States. Natural gas exports from Canada to the United States are expected to continue to decline due to growth in natural gas needs in Canada itself. Similarly, the demand of other countries, in particular developing countries like China and India, may have a significant impact on future LNG supply and prices. This is graphically demonstrated by Exhibit No. ___ (SAW-8), a chart drawn from information in the DOE 2007 Annual Energy Outlook, which shows that LNG will grow as a source of natural gas for the United States over the next twenty-five (25) years. By 2030, LNG is expected to constitute a significant portion of the natural gas needed to balance supply and demand for the United States. At the same time, there will be much greater worldwide demand for LNG and the United States will have to compete via price to attract the LNG to the United States from other countries, such as those in Asia who are very dependent on LNG and are willing to sign longer term contracts at higher prices that are in parity with oil prices.

Significantly too, 70 percent of the world's oil and gas is held by national (state-owned) oil and gas companies such as Russia, Qatar, and Iran who control a majority of the world's natural gas reserves. This is graphically demonstrated by Exhibit No. ____ (SAW-9), which is a chart of the world natural gas reserves by

geographic region that shows that the largest reserves of natural gas in the world are located in the Middle East and Eurasia. Instability in the future in these regions and the on-going speculation that certain countries may have an interest in forming a future "Gas Cartel" could arguably have an adverse impact on the supply of and price of LNG. As outlined earlier, given higher natural gas prices and the reality of continued growth in the world wide demand for natural gas, these new international players could potentially have larger influences on global natural gas prices. At a minimum the United States and other countries are becoming more dependent on non-traditional sources of natural gas supply that are not produced and controlled by them.

All of these economic and socio-economic factors, and many others, have an impact on the forecast for future natural gas prices. All of these existing and potential factors were considered and evaluated by the independent experts PEF retained for its fuel forecasts and by PEF in preparing PEF's mid-level natural gas fuel forecast. These factors also play a part in the Company's evaluation of nuclear generation as a future alternative generation resource in the time period 2016 to 2017 and beyond.

Q. Are there other reasons to consider an alternative to natural gas-fired generation in the time period Levy Units 1 and 2 are planned for commercial operation?

A. Yes. The expected relative price differential is not the only reason to evaluate other generation alternatives to diversify PEF's fuel generation resources. Without Levy Units 1 and 2, PEF will likely be forced to continue to rely on natural gas-fired combined cycle generation, which will only serve to adversely impact PEF's fuel diversity by increasing the percentage of energy generation that relies on natural gas.

This outcome can further subject PEF and its customers to even more volatility from natural gas prices in the future due to transportation constraints, supply availability and adverse weather impacts, especially in Florida. Florida is a peninsula that, in effect, operates as a bottle-neck at certain times when it comes to supplying Florida utilities with natural gas. The existing pipelines that serve the natural gas needs in the State of Florida are expected to be fully subscribed by 2009. Expansions of existing pipelines will be needed to meet future planned gas generation demand. Expansions will become increasingly more expensive and could lag behind demand. As a result, during peak time periods, such as during the summer in Florida, the supply of natural gas to Florida utilities could be more restricted, leading to greater risk of a price basis increase to Florida over the Henry Hub price.

Additionally, significant natural gas supplies for Florida utilities are located near, on, or in the Gulf of Mexico. The Gulf of Mexico and the State of Florida are subject to extreme weather conditions, such as hurricanes. This risk is always present during hurricane season and was certainly the case during the hurricane seasons of 2004 and 2005. During and following these extreme weather conditions, natural gas production was shut down, facilities were damaged and production was limited until conditions improved which lead to extreme price levels and volatility. When these events occur, they have an upward effect on the natural gas price as the availability of supply can be significantly reduced. If extended curtailments occur, such price increases cannot be mitigated by storage as baseload on-site or underground natural gas storage is not considered economic and is not available. As a result, these events

are expected to continue to have an impact on the price of natural gas and in turn energy generation for PEF and its customers in the future.

Alternative fuel generation, like that offered by Levy Units 1 and 2, will provide greater fuel diversity and fuel supply reliability, thus mitigating these economic impacts from restrictions on natural gas supply when demand is high. Nuclear fuel re-fueling outages occur relatively infrequently, about every eighteen (18) to twenty-four (24) months, and even then they can be delayed somewhat if nuclear generation is necessary. This ability to continue to supply power provides price mitigation capabilities that simply do not economically exist with natural gas-fired generation.

Q. Does this conclude your testimony?

A. Yes.

IN RE: PETITION ON BEHALF OF PROGRESS ENERGY FLORIDA, INC. FOR NUCLEAR NEED

FPSC DOCKET NO. _____

DIRECT TESTIMONY OF JOHN SIPHERS

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is John Siphers. My business address is 410 South Wilmington Street, Raleigh, North Carolina, 27601.

Q. Please tell us how you are employed and describe your background.

A. I am employed by Progress Energy as the Manager-Nuclear Fuel Management & Safety Analysis Section. I have held this position for two years. My responsibilities include negotiating and managing the uranium mining, conversion, enrichment, and nuclear fuel fabrication contracts for both Progress Energy Carolinas, Inc. ("PEC") and Progress Energy Florida, Inc. ("PEF"). I am responsible for making sure the PEC and PEF nuclear generation power plants have sufficient nuclear fuel, on time, and at a reasonable cost. I will also be responsible for obtaining the nuclear fuel for the additional, new generation nuclear power plants planned by both PEC and PEF. This includes Levy Units 1 and 2. I have a Bachelor's degree in Nuclear Engineering from N.C. State University, and have over 25 years of experience in nuclear fuel operation, design, and procurement.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your testimony?

A. In support of the Company's petition for a determination of need for Levy Units 1 and 2, I will explain the nuclear fuel requirements for Levy Units 1 and 2. I will describe the components of and the process for producing nuclear fuel. I will also explain the costs of nuclear fuel. I will further put the current nuclear fuel cost in historical context, explain what we expect to happen to the future cost, and explain how we manage nuclear fuel costs. I will also explain how changes in the cost of nuclear fuel impacts customers relative to other fuels used to produce energy on PEF's system. Likewise, I will explain how nuclear fuel use helps insulate nuclear fuel costs from market volatility typically experienced by other, fossil fuels. Finally, I will explain the process for and cost of storing spent nuclear fuel. In sum, I will provide support that nuclear fuel has historically been and is expected to be in the future the most stable fuel in terms of fuel cost to the customer with a significantly lower total fuel cost for the energy produced than fossil fuels.

Q. Are you sponsoring any sections of the Company's Need Study, Exhibit No. ___ (JBC-1)?

A. Yes, I am sponsoring the nuclear fuel and nuclear fuel forecast section, which explains the nuclear fuel components, the current price of nuclear fuel for Levy Units 1 and 2, and the nuclear fuel price forecast for Levy Units 1 and 2.

Q. Are you sponsoring any exhibits to your testimony?

A. Yes, I am sponsoring the following exhibits to my testimony:

- Exhibit No. ___ (JS-1), the 2007 nuclear fuel burn cost components;
- Exhibit No. ___ (JS-2), the chart of the historical and current uranium market in $/lb of U308;
- Exhibit No. ___ (JS-3), an average burn cost fuel comparison on a $/mmBtu cost basis from 2002 to 2010 for nuclear fuel, coal, natural gas, and oil; and
- Exhibit No. ___ (JS-4), the Company's nuclear fuel forecast through 2036 in terms of the burn cost in mills/kWhe.

Each of these exhibits was prepared under my direction, and each is accurate.

Q. Please summarize your testimony.

A. Uranium used for nuclear fuel is a relatively abundant natural mineral. There is, therefore, sufficient raw material for additional nuclear reactors like Levy Units 1 and 2. Likewise, the production capacity to mill, process, enrich, and fabricate uranium into nuclear fuel assemblies used in nuclear reactors like Levy Units 1 and 2 will also expand to meet future demand. Nuclear fuel costs have increased compared to the historically depressed prices we have seen in the past but they are expected to stabilize in the future. The Company's nuclear fuel forecast represents this expectation, and is a reasonable forecast of future nuclear fuel costs based on the Company's expertise and judgment. Nuclear fuel is and will be less volatile and more stable than other, fossil fuels. It will cost less relative to fossil fuels too, making nuclear fuel generation an attractive economic alternative for PEF and its customers in the future.

III. NUCLEAR FUEL COMPONENTS AND COST

Q. What are the components of nuclear fuel that will be used by Levy Units 1 and 2?

A. Nuclear fuel begins with uranium, which must be mined from the ground using various mining techniques. This raw uranium ore is then milled near the mine to produce an oxide called U308. Another industry term for U308 is "yellowcake." Uranium is found in many locations worldwide. Progress Energy currently contracts for uranium mined in the United States, Canada, Australia, Kazakhstan, Uzbekistan and Namibia. Uranium is a common mineral so there is little risk that there will be insufficient uranium to meet current and future nuclear energy production needs. Currently, however, there are limited open uranium mines due to historically depressed uranium prices. As uranium prices rise, which recently occurred, expansions of existing mines and the development of new mines are expected to meet demand.

The next step is the chemical conversion of the U308 to UF6, which reaches a gaseous state when heated. Any impurities are removed during this chemical process and the process of converting the UF6 to a gas is necessary for the next step in production. This step is the enrichment process. Existing and next generation reactors use uranium with a higher percentage of the U-235 isotope than is found in nature. Natural uranium contains 0.711 percent U-235, while Levy Units 1 and 2 will need a range of approximately 3 percent to 5 percent U-235, which is typical of

existing nuclear power reactors too. The enrichment process raises the UF6 from 0.711 percent U-235 to 3 percent to 5 percent U-235.

The final step is to take the enriched UF6, change it to a powder, press and sinter the powder into ceramic pellets, feed the pellets into tubes in a pre-set order with inert elements, seal the tubes (sometimes called "rods") and bundle them together into fuel assemblies. This is the fabrication process. Once the fuel assemblies are complete, they are shipped to the nuclear power plant site for insertion into the nuclear reactor.

Q. How do the components of nuclear fuel contribute to its total cost?

A. There is a cost for each component of the nuclear fuel that is ultimately placed into the nuclear reactor. The total cost of nuclear fuel to the customer will likely include a fee called the high level waste fee and various labor and other miscellaneous costs. The representative percentage of each of these costs in the total fuel burn cost to the customer in 2007 is shown in Exhibit No. ___ (JS-1) to my testimony. As you can see, the cost of the uranium enrichment, followed by the cost of the yellowcake, the fabrication, and the waste fees, account for the greatest percentage expense of the total nuclear fuel cost. The remaining costs, including the conversion costs, are relatively minor in relation to the total fuel cost. Recently, we have seen changes in this fuel burn cost mix, with the yellowcake cost increasing as a component of the total fuel burn cost because, as I mentioned before, the cost of uranium increased.

Q. What caused the recent increase in uranium prices?

A. Currently, the supply of uranium and demand for it are not in balance and, as a result, uranium prices have increased in the short-term market. A number of factors contribute to this short-term price increase. While uranium is an abundant mineral, uranium mines are not, so there are a limited number of current suppliers for the number of potential purchasers. Further, governments can quickly influence the market price by, for example, increasing investment in building or dismantling nuclear powered vessels or nuclear weapons. The uranium market has fewer suppliers and purchasers when compared to other commodities, so imbalances can be expected where there will be periods of uranium shortages as well as periods of oversupply. In other words, the uranium market is subject to "booms" and "busts."

Over the last two decades, uranium prices have been depressed, which is one reason supply is more restricted now, but there have been periods of similar price escalations, such as in the late 1970's when new nuclear plant orders drove up uranium prices. This is graphically demonstrated in Exhibit No. ___ (JS-2), which tracks the uranium price in $/lb U308 from 1969 to 2007. As shown in Exhibit No. ___ (JS-2), immediately after the end of new plant orders in the late 1970's, uranium prices returned to and below historic price levels. A similar period where new plant orders are being announced is occurring now. Consistent with the return to lower prices in the 1980's, we expect that future uranium prices will stabilize, however the need for new mine development will likely result in prices higher than those we have seen in recent years. Our uranium price forecast incorporates this expectation.

Q. Why do you believe uranium prices will fall to more moderate levels in the future?

A. Recent price spikes cannot be sustained for long periods of time. During short-term price spikes purchasers will refrain from making purchases unless absolutely necessary, preferring to rely on uranium inventories already in the production pipeline. In fact, we have already seen some moderation in the uranium price from its highest levels in early 2007. Additionally, uranium price increases at these levels will spur the expansion of existing mines or the development of new mines, thus, increasing the production of yellowcake. The lead time for existing uranium mines to expand or suppliers to open new mines should coincide with or occur before commercial operation of the next generation of nuclear power plants. As a result, uranium production is expected to meet demand in the future, when Levy Units 1 and 2 come on-line. In fact, uranium production may exceed demand in that time frame if all of the planned nuclear generation is not built.

Q. What is the impact of uranium price increases on customers?

A. Since mined uranium is a component of the nuclear fuel burn cost that customers pay, if the uranium price increases then the cost to the customer increases. Likewise, if uranium conversion, enrichment, and fabrication costs increase along with uranium price increases, the total nuclear fuel burn cost will increase, and customers will pay more. This is true with current uranium price increases and it will be true for such price increases, or increases in the other nuclear fuel cost components, in the future,

should they occur. Such increases from the customer perspective are relative, however.

The cost of nuclear fuel on a comparable basis to fossil fuels is still much lower, even with the recent uranium price increases. As demonstrated by Exhibit No. ___ (JS-3), the average yearly $/mmBtu cost of nuclear fuel to the customer is lower than any fossil fuel alternative, even with the uranium price increases, which are evident in the period from 2008 to 2010. These price increases show up in this time period because there is a lag time between when the uranium is purchased and when it is used in the next refueling outage, due to the time necessary to go through the conversion, enrichment, and fabrication process, and then be placed in line for re-fueling. Nuclear fuel generation is still an attractive economic alternative on a $/mmBtu for customers to other fossil fuel generation, and it will be in the future too, when Levy Units 1 and 2 achieve commercial operation.

Q. Are there any other cost benefits from using nuclear fuel as opposed to fossil fuels that customers receive?

A. Yes. After the initial fuel core is installed in a nuclear reactor, about 30 percent to 40 percent of the nuclear fuel assemblies are replaced during re-fueling outages which take place every eighteen (18) to twenty-four (24) months. Fossil fuel generation, on the other hand, requires constant to near constant re-fueling. Fossil fuels are also subject to wider and more frequent price fluctuations than those experienced with nuclear fuel. As a result, customers are exposed to more frequent and volatile fluctuations in fossil fuel market prices in part because fossil fuels need to be

regularly purchased to produce energy from fossil fuel generation plants. Nuclear fuel generation helps insulate customers from such frequent and volatile price fluctuations in the fossil fuel markets by providing greater price stability and reliability.

IV. NUCLEAR FUEL SUPPLY FOR LEVY UNITS 1 AND 2

Q. When will the Company need the nuclear fuel for Levy Units 1 and 2?

A. PEF will likely contract for the uranium supply several years before the units are operational to ensure there is a supply of uranium for the nuclear fuel for the units. As utilities, like PEF, with plans for the construction of nuclear reactors pursue such contract negotiations, the expansion of existing mines or development of new mines will occur.

Q. Will there be sufficient conversion, enrichment, and fabrication capacity in the future to process the uranium into nuclear fuel?

A. Yes. Conversion, enrichment, and fabrication capacity will track uranium production, therefore, there should be sufficient capacity in time to meet the needs for Levy Units 1 and 2. Uranium enrichment is currently supplied to U.S. utilities by several companies around the world, each with current projects in place to expand capacity. Likewise, uranium conversion, enrichment, and fabrication capacity is expected to expand to meet demand, in fact the fabrication facilities have some excess capacity at this time. Additional future capacity for these fuel components will require relatively straightforward factory expansions or additions; modest price increases in these

components may be necessary to provide the capital needed for this expansion, but there should not be a price spike in these components similar to that recently seen in the uranium market.

Q. Will the Company take steps to manage the nuclear fuel cost for Levy Units 1 and 2?

A. Yes. The Company competitively bids uranium and other nuclear fuel component services but will purchase uranium or services from a sole service provider when the arrangement is economically beneficial to customers. Typically, the Company has four to six uranium suppliers at any given point, and the Company will rely on spot purchases when market conditions warrant such purchases. The Company also attempts to develop a contract portfolio with various term lengths and pricing provisions to attempt to capture low prices while minimizing exposure to short term price volatility. All of these contract procurement and management techniques and efforts will also be used in purchasing nuclear fuel for Levy Units 1 and 2.

Q. What about the disposal of spent nuclear fuel, how will that be handled for Levy Units 1 and 2?

A. During re-fueling of Levy Units 1 and 2, when a third of the nuclear fuel assemblies are replaced, the spent fuel will be stored for several years in a spent fuel pool, consistent with Nuclear Regulatory Commission ("NRC") requirements and current practice. This storage is necessary to sufficiently cool the spent fuel after it has been removed from the reactor. Thereafter, the spent fuel will be either stored on-site in

proven, environmentally sound dry cask storage, or disposed of or reprocessed by the Department of Energy ("DOE"). While PEF does not yet have a contract with DOE for spent fuel disposal from Levy Units 1 and 2, the Nuclear Waste Policy Act of 1982 establishes that the responsibility for the disposal of spent fuel lies with the Federal Government.

IV. NUCLEAR FUEL COST FORECAST

Q. What is the Company's nuclear fuel cost forecast?

A. The Company's nuclear fuel forecast through 2036 in terms of the burn cost in mills/kWhe is included in Exhibit No. ___ (JS-4) to my testimony. This fuel forecast reflects the Company's best estimate of the reasonable, future nuclear fuel costs using industry-recognized forecast methods.

Q. Please describe how you prepared the nuclear fuel forecast.

A. To project the costs of the components of the nuclear fuel assemblies, the Company procures forecasts from market consultants who study the supply and demand of the nuclear fuel market worldwide. The Company reviews these projections and may make revisions based on its own knowledge gained from recent procurements and interactions with suppliers. This market cost forecast is input to models of current and expected contract terms in order to arrive at the Company's expected costs each year for uranium, conversion, enrichment, and fabrication services. These cost projections are combined with projections of the amount of nuclear fuel needed for each operating cycle to obtain a total cost for the nuclear fuel loaded into the core.

For the AP-1000 plants planned for Levy Units 1 and 2, detailed projections have already been developed by Westinghouse, the plant supplier. Following the determination of the total fuel cost, the fuel cost to be amortized and charged to the customer is calculated by determining the amount of energy produced by each fuel assembly on an annual basis. With the addition of an estimated 1 mill per kWh spent fuel disposal fee, this forms the basis of our estimated fuel cost from Levy Units 1 and 2.

Q. Has the Company developed a low and high nuclear fuel forecast?

A. No, it has not. As I have explained, the Company's nuclear fuel forecast represents the Company's best estimate of the future costs of all components that make up the total nuclear fuel cost to the customer based on the Company's current and future contracts, the Company's analysis of market information from a variety of sources and consultants, and the Company's experience and judgment. We believe that our nuclear fuel forecast is, as a result, the most reasonable projection of future nuclear fuel costs. Further, because the total nuclear fuel cost to the customer has been historically and is expected to be less volatile and more stable than costs from other fossil fuel resources available to the Company, there is little need for alternative fuel forecasts to what we believe is the reasonable, future projection of nuclear fuel costs.

Q. Does this conclude your testimony?

A. Yes.

CHAIRMAN CARTER: And that should bring us through to Witness Kennedy, I believe, would be next. Is that correct?

MS. FLEMING: That's correct.

MR. BURNETT: Yes, sir. We would call Mr. Kennedy to the stand.

Mr. Chairman, Mr. Kennedy was not sworn yesterday. So while he's still standing, you may want to get him.

CHAIRMAN CARTER: Okay. Great. I'll let him get his water and then we'll --

(Interruption.)

That's all right. Let's take five, let's take five to kind of get --

THE WITNESS: I'm sorry.

CHAIRMAN CARTER: That's not a problem. Let's just take five.

(Recess taken.)

We're back on the record.

Mr. Kennedy, now you see why, you see when the Commissioners get the pitcher, we hold it over to the side.

(Laughter.)

THE WITNESS: I apologize.

CHAIRMAN CARTER: Would you please stand, sir, and raise your right hand.

J. MICHAEL KENNEDY

was called as a witness on behalf of Progress Energy Florida

and, having been duly sworn, testified as follows:

CHAIRMAN CARTER: Mr. Burnett.

DIRECT EXAMINATION

BY MR. BURNETT:

Q Mr. Kennedy, will you please introduce yourself to the Commission and provide your business address.

A Yes. My name is Michael Kennedy. I'm a Principal Environmental Specialist for Progress Energy, and my business address is 299 First Avenue North, St. Petersburg, Florida.

Q And have you filed prefiled direct testimony and exhibits in this proceeding?

A Yes.

Q Do you have those before you?

A I do.

Q Do you have any changes to make to your prefiled testimony or exhibits?

A I do not.

Q Okay. And if I asked you the same questions in your prefiled testimony today, would you give the same answers that are in your prefiled testimony?

A Yes.

MR. BURNETT: Mr. Chair, we would ask that the prefiled testimony of Mr. Kennedy be entered into the record as if it was read today.

CHAIRMAN CARTER: The prefiled testimony will be

entered into the record as though read.

IN RE: PETITION FOR DETERMINATION OF NEED FOR LEVY UNITS 1 AND 2 NUCLEAR POWER PLANTS

FPSC DOCKET NO. _____

DIRECT TESTIMONY OF J. MICHAEL KENNEDY

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. J. Michael Kennedy, P.O. Box 14042, St. Petersburg, Florida 33733.

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

A. I am employed by Progress Energy Service Company as a Principal Environmental Specialist.

Q. What do you do?

A. In my current role, which I assumed in August 2005, my responsibilities include analyzing and assessing emerging environmental legislative and regulatory issues for Progress Energy Florida ("PEF" or the "Company") and Progress Energy Carolinas. Prior to that, I managed the environmental permitting and compliance activities in support of Florida Power Corporation's and then PEF's generating fleet, including air permitting and Title V issues. For ease of reference, I will refer to Florida Power Corporation and PEF together as PEF except when circumstances may warrant a distinction between the two companies.

Q. Please describe your education background and professional experience.

A. I earned a Bachelor of Science degree in Meteorology from Purdue University in 1978. Before coming to work at then-Florida Power Corporation, from January 1990 to June 1992, I was a Senior Environmental Scientist at Indianapolis Power & Light Company, where my responsibilities included support of generating plants in the area of air permitting and compliance. From August 1986 to December 1989, I was the Permitting and Planning Manager for the Indianapolis Air Pollution Control Division. I managed the areas of air operating and construction permits, air quality modeling and planning, and regulatory development for Indianapolis/Marion County, Indiana. From June 1978 to July 1986, I worked as an Air Quality Planner for the Indianapolis Air Pollution Control Division. There I helped develop the State Implementation Plan for compliance with the 1977 Clean Air Act Amendments. I also reviewed air operating and construction permit applications and assisted with compliance inspections at the major sources in the county.

Q. Are you sponsoring any sections of the Company's Need Study, Exhibit No. ___ (JBC-1)?

A. Yes. I am sponsoring the subsection of Section IV, C., 9 of the Need Study addressing the reduction of air emission compliance costs due to existing and future potential environmental regulation including greenhouse gas emissions ("GHG").

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits that I prepared or that were prepared under my supervision and control:

- Exhibit No. ____ (JMK-1) which is a Emission Comparison Chart;
- Exhibit No. ____ (JMK-2) which is a Lifecycle CO_2 Emission Summary;
- Exhibit No. ____ (JMK-3) which is an Estimated CO_2 Emission Cost Graph; and
- Exhibit No. ____ (JMK-4) which is an Annual CO_2 Emissions Avoided by Proposed Levy Nuclear Units Chart.

All of these exhibits are true and accurate to the best of my knowledge.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address environmental emission issues related to nuclear generation, including greenhouse gas emissions.

Q. Please summarize your testimony.

A. Nuclear power plants emit no air pollutants during operation. Unlike fossil fuel powered generating facilities, the Levy nuclear units will produce no NO_x, SO_2, mercury, or greenhouse gas emissions, such as carbon dioxide (CO_2). As a result, Levy Units 1 & 2 will avoid up to 1.4 million tons of NO_x, up to 5.8 million tons of SO_2, approximately 28,800 pounds of mercury, and approximately 864 million tons of CO_2 emissions when compared to the emissions from a conventional coal-fired plant. For carbon alone, this equals removing approximately 2.9 million cars per year off Florida roads over 60 years,

or a total of 174 million cars. No other generating resource has these significant environmental benefits.

To date, no federal or state laws impose direct limits on GHG emissions, including carbon emissions. However, a number of bills have been introduced in Congress which would, if enacted, regulate such emissions. In addition, Florida Governor Charlie Crist issued Executive Order 07-127 on July 13, 2007, which directed the Florida Department of Environmental Protection to enact some of the most restrictive limits on GHG emissions in the nation. Under Governor Crist's proposal, Florida electric utilities would be required to reduce GHG emissions to 2000 levels by 2017, to 1990 levels by 2025, and to 20 percent of 1990 levels by 2050. Irrespective of what specific GHG regulations are eventually enacted in the future, however, the zero GHG emitting Levy units will certainly help PEF comply with any such requirements.

II. BACKGROUND ON GHG AND OTHER (NO_x, SO_2, MERCURY) EMISSIONS

Q. Please explain greenhouse gas.

A. A greenhouse gas (GHG) is a substance that, when present in the atmosphere, absorbs or reflects outgoing energy into the atmosphere or back to earth. A certain amount of this effect is necessary for life, because without this effect the average temperature of the earth would be well below freezing. If an excess amount of greenhouse warming occurs, then the average temperature of the planet may increase. There are several compounds that act as GHGs, and CO_2 is the dominant GHG emitted by human activities.

Q. How are greenhouse gases emitted?

A. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, and fluorinated gases. Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances (i.e., CFCs, HCFCs, and halons). These gases are typically emitted in smaller quantities, but because they are potent greenhouse gases, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases").

Q. Please describe the types of electrical generating facilities that emit greenhouse gas.

A. Any electric generating facility that uses fossil fuel to produce power emits GHGs. These include all coal, oil, and natural gas-fired facilities.

Q. Are there GHG emissions associated with burning non-fossil sources such as ethanol derived from sugar cane or citrus waste?

A. Yes. Burning ethanol produces CO_2 emissions similar to those for a light oil.

Q. Are there any proposals at the federal or state level to regulate or address greenhouse gas emissions?

A. A number of congressional proposals to advance programs designed to reduce greenhouse gases have been introduced in the 110th Congress. There are generally three types of proposals. First, there are proposals designed to improve the monitoring of greenhouse gas emissions to provide a basis for research and development, and for any potential future reduction scheme. Second, there are proposals to enact a market-oriented greenhouse gas reduction program similar to the trading provisions of the acid rain reduction program established by the 1990 Clean Air Act Amendments. The third type of proposals serve to enact energy and related programs that would have the added effect of reducing greenhouse gases such as requiring energy producers to generate a portion of generation from renewable resources.

On July 13, 2007, Governor Crist issued three executive orders calling for immediate action to reduce greenhouse gas emissions in the State of Florida. In Executive Order No. 07-127, the Governor established emission reduction targets to substantially reduce greenhouse gas levels. He also ordered his administration to

develop emission reduction standards for electric utilities and motor vehicles. The Florida Energy Commission, in January 2008, proposed similar reductions.

III. HOW NUCLEAR CONTRIBUTES TO REDUCED GHG AND OTHER AIR EMISSIONS

Q. Explain why there are no air emissions associated with nuclear generation.

A. Air emissions are produced by the burning of fossil fuels. Since nuclear power plants do not use fossil fuels to produce electricity, there are no emissions associated with it.

Q. Compare the air emissions of nuclear generation to emissions from other electric generating sources.

A. Nuclear power plants emit no air pollutants while generating electricity. Comparatively, a conventional coal-fired boiler will produce about 2,200 pounds of CO_2 for each megawatt-hour (MWh) of electricity it produces. A natural gas-fired facility produces about half of that, or 1,100 lb of CO_2/MWh. Prior to pollution control systems, a conventional coal-fired power plant of 1,092 MW capacity can emit up to approximately 48,000 tons of SO_2, 12,000 tons of NO_x, 240 pounds of mercury, and 7.2 million tons of carbon dioxide (CO_2) per year. For CO_2, this equals the emissions from approximately 2.9 million cars. Advanced air pollution control systems will remove approximately 95% of the SO_2, 90% of the NO_x, and 80% of the mercury, resulting in emissions of approximately 2,400 tons of SO_2, 1,200 tons of NO_x, and 48 pounds of mercury from a coal-fired power plant.

A 1,092-MW natural gas-fired combined-cycle combustion turbine power plant will emit approximately 12 tons of SO_2, 240 tons of NO_x, a negligible amount of mercury, and 3.2 million tons of CO_2 per year. A nuclear plant with the same capacity emits none of these compounds. Exhibit No. ____ (JMK-1) graphically depicts the comparison in annual emissions between a coal-fired plant, a natural gas-fired combined-cycle plant, and a nuclear plant.

Q. What is the quantity of these avoided emissions on a long-term basis?

A. Compared to a coal-fired facility of similar capacity, a 1,092-MW nuclear plant will avoid up to approximately 2.9 million tons of SO_2, 720,000 tons of NO_x, 14,400 pounds of mercury, and 432 million tons of CO_2 over a 60-year timeframe. If we make that comparison to a natural gas-fired, combined-cycle facility of similar capacity, the nuclear facility will avoid up to approximately 720 tons of SO_2, 14,400 tons of NO_x, and 192 million tons of CO_2.

Q. What is the quantity of avoided emissions for Levy Units 1 & 2?

A. Levy Units 1 & 2 would avoid approximately 5.8 million tons of SO_2, 1.4 million tons of NO_x, 28,800 pounds of mercury, and 864 million tons of carbon dioxide over a 60-year life time when compared with the potential emissions from a coal-fired plant. Compared to a natural gas-fired, combined-cycle facility, Levy Units 1 and 2 would avoid approximately 1,440 tons of SO_2, 28,800 tons of NO_x, and 384 million tons of CO_2. Exhibit No. ____ (JMK-4) graphically depicts the annual CO_2 emissions avoided by the proposed Levy nuclear units.

Q. How do the life-cycle CO_2 emissions from nuclear power compare with other electricity-generating technologies?

A. As stated previously, a nuclear power unit generates no CO_2 while operating. There are CO_2 emissions associated with the construction of the unit, the mining and processing of uranium, and the transportation of fuel to the plant. Over the life time of the plant, however, such life-cycle emissions are quite low and they compare favorably with other electric generating technologies. In fact, the life-cycle emissions from nuclear power are lower than those from solar photovoltaic (PV) power, because a great deal of emissions are associated with the preparation of the pure silicon that is needed for the PV panels. Exhibit No. ____ (JMK-2) is a summary of the life-cycle CO_2 emissions from several electric-generating technologies.

IV. CURRENT STATE OF AIR QUALITY REGULATION

Q. Are there environmental air quality and emissions regulations related to fossil generation?

A. Yes, there are several.

Q. Please explain how air quality is currently regulated by the state and federal governments.

A. The federal government regulates air quality through the Clean Air Act (CAA) and its amendments, the most recent of which were passed by Congress in 1990. States are required to implement the provisions of the CAA through the State Implementation Plan

(SIP) process. SIPs are comprised of regulations at the state level that are reviewed and approved by Environmental Protection Agency (EPA).

Q. Please explain National Ambient Air Quality Standards.

A. National Ambient Air Quality Standards (NAAQS) are pollutant concentration levels set by EPA to protect health and welfare. Several key pollutants, known as criteria pollutants, are measured through an extensive, nation-wide monitoring network. Areas with monitors that register levels greater than the NAAQS must take steps to reduce emissions in order to attain compliance.

Q. Please explain the U.S. Acid Rain Program.

A. Congress created the Acid Rain program with the 1990 CAA amendments. It requires reductions in SO_2 and NO_x emissions from electric utility power plants throughout the country. Utilities reduced emissions significantly through the Acid Rain program, and additional regulations promulgated in the past two to three years require deeper reductions.

Q. What additional air quality regulations apply to fossil generation and what challenges does PEF have in meeting them?

A. Current major air quality regulations at the state and federal levels are the Clean Air Interstate Rule (CAIR), which requires significant additional reductions in SO_2 and NO_x emissions, the Clean Air Mercury Rule (CAMR), which requires reductions in mercury emissions from fossil fuel-fired power plants nation-wide, and the Clean Air Visibility

Rule (CAVR), which may require additional reductions in SO_2 and NO_x in order to improve and protect visibility in national parks and wilderness areas. All of these regulations significantly affect Florida and PEF's existing generation fleet. For example, PEF is currently implementing its compliance plan to meet these new regulatory requirements, which will include the Company investing more than $1.2 billion in pollution control installations at our Crystal River and Anclote fossil fuel-fired facilities.

Q. What other environmental restrictions are being discussed at the federal and state level that could impact the Company's generation resource plan?

A. As discussed above, there are several climate change bills active in Congress that would require significant reductions in GHG emissions from electric utilities. In addition, in July 2007, Florida Governor Charlie Crist issued executive orders requesting deep reductions in GHG emissions from the state's electric utilities. The Florida Energy Commission in January 2008 proposed similar reductions. These goals, if implemented, will be extremely challenging to meet, particularly given the growth rate in Florida's population and associated electric demand.

Q. What are the specific GHG reduction targets in the federal proposals you mentioned before?

A. Several current Federal legislative proposals cap greenhouse gas emissions at 1990 levels in the year 2020. After year 2020, proposals contain requirements to reduce emissions by roughly 5% annually from the previous year's level through 2050. Other proposals establish renewable portfolio standards for electric generating facilities.

Q. What are the reduction targets in the state proposals?

A. Governor Crist's Executive Order No. 07-127 has directed the Secretary of Environmental Protection to adopt maximum allowable emissions level of greenhouse gases for electric utilities requiring at a minimum to reduce emission in the year 2017 to year 2000 levels; 2025 emissions must not exceed year 1990 utility sector emissions, and emissions in 2050 must not be greater than 20% of year 1990 utility sector emissions.

Q. Please discuss the current DEP rulemaking activity in Florida.

A. In Executive Order 07-127, Governor Crist instructed the Florida Department of Environmental Protection (DEP) to initiate a rulemaking to implement the caps on electric utility emissions contained in the order. DEP began this process with its first rulemaking workshop in August 2007 and a second workshop in December 2007. To date, the DEP has not issued a proposed rule, but such a proposal may be forthcoming in the near future.

Q. Are there any greenhouse gas activities ongoing before the Florida Energy Commission?

A. The Florida legislature created the Florida Energy Commission (FEC) in 2006. The FEC is a nine-member panel comprised of representatives from academia, environmental interests, and business to consider energy and climate change policy for the state. The FEC provided its recommendations in a report to the Legislature at the end of 2007. Among them is a recommendation, similar to Governor Crist's proposal, that would

require reductions of emissions of GHGs in the state to 2000 levels by 2020, to 1990 levels by 2030, and to 20 percent of 1990 levels by 2050.

Q. Please discuss Governor Crist's Action Team.

A. In Executive Order 07-128, Governor Crist created the Florida Governor's Action Team on Energy and Climate Change to develop a comprehensive Energy and Climate Change Action Plan to effectuate greenhouse gas reductions specified in Executive Order 07-127. The Action Team provided its initial framework recommendations to the Governor on November 1, 2007. The details for the implementation of the recommendations will be developed through a stakeholder-driven process in 2008. Final recommendations are due to be submitted to the Governor by October 1, 2008.

Q. Has the issue of greenhouse gases been discussed in any recent need proceedings before the Florida Public Service Commission?

A. Yes, in Florida Power and Light's ("FPL") need proceeding for its Glades Units, the Sierra Club filed testimony that focused on the likelihood of future requirements to reduce emissions of GHGs. The Sierra Club agrees that business and industry must plan for a carbon-constrained future. A tabular summary was included of the 17 Congressional bills addressing climate change as of January, 2007, most of which would require significant reductions in GHG emissions to levels as low as 80% below 1990 emissions by the year 2050. In addition, the Sierra Club discussed state and regional activity, such as the Regional Greenhouse Gas Initiative in the Northeast U.S. and the orders to reduce GHG emissions from California Governor Arnold Schwarzenegger.

Finally, the Sierra Club testimony discussed potential carbon costs in the future and recommended that utilities should include the potential cost of carbon in their resource planning.

Q. Discuss FPL statements regarding greenhouse gases in its Glades Need Case and its Turkey Point 6 & 7 Nuclear Need Case.

A. Mr. Kennard Kosky was FPL's witness regarding environmental matters for both the Glades need case and the Turkey Point 6 & 7 need case. Although there are currently no regulations regarding emissions of CO_2, FPL considered the potential cost of carbon regulation on the operation of the Glades facility and concluded that it is the most cost-effective alternative. In its comparison of emissions from electric-generating technologies, however, FPL did not compare air emissions from the proposed Glades facility to those of a comparably-sized nuclear plant.

In his Turkey Point testimony, Mr. Kosky stated that FPL's proposed nuclear units are the preferred alternative from an environmental perspective in that their operation will generate no air pollutant emissions, including GHG emissions. Mr. Kosky compared the life-cycle emissions of nuclear power with other power-generating technologies, including fossil fuel-fired plants, wind power, and solar photovoltaic (PV) generation. Mr. Kosky stated that life-cycle emissions from solar PV are actually higher than those from either wind or nuclear power. Finally, although there are currently no regulations of GHG emissions, Mr. Kosky concludes that there are likely to be in the future, adding cost to the operation of facilities that emit GHGs. The proposed Turkey

Point 6 & 7 nuclear units will not add cost to FPL's operations in the area of carbon regulation because they will not emit GHGs.

Q. You mentioned that in his testimony, Mr. Kosky added costs to the operation of facilities that emit GHGs. Have you endeavored to make estimates of what those costs may be?

A. As I mentioned before, there are no current GHG regulations, and no one can say with certainty what the future will be in this regard. We believe some form of GHG legislation is likely and that such legislation would impose a cost for emissions of greenhouse gases, but the timing and nature of the policy is uncertain. Rather than placing probability weights on policy scenarios, we have elected to show a range of potential future costs for CO_2 to demonstrate the potential range of impacts on the economic analysis for the Levy units. Based on all the information available to me now, I have prepared reasonable estimates as to what costs may arise for GHG-producing facilities.

Q. Please discuss how you arrived at your estimates for GHG costs.

A. The first step in my analysis was to gather all the various federal and state GHG regulations that have been proposed to date along with other studies that have attempted to estimate what future GHG costs may be. From each of these sources, I extracted dollars/ton of CO_2 figures and plotted them on a graph ranging temporally from 2006-2050. The results of my findings are depicted on Exhibit No. ____ (JMK-3).

In 2020, the various proposals ranged from a low of $21/ton of CO_2 emissions to a high of $80/ton. As reflected on Exhibit No. ____ (JMK-3), most proposals centered on an average estimate of around $30/ton in 2020 but some were higher. Based on these data, I developed a reasonable projection of a representative high case based on the most stringent current federal and state regulatory proposals, a high academic case projection of the likely outcome given the various legislative and regulatory proposals, and a "middle" and "low" case estimate for potential future CO_2 emissions costs. Respectively, in 2020 for example, those figures are $21/ton, $32/ton, $63/ton, and $80/ton.

V. POTENTIAL CONSEQUENCES OF VARIOUS PROPOSALS

Q. Are there environmental compliance costs associated with the current and proposed regulations you have discussed?

A. There are significant costs incurred in order to comply with environmental requirements. There are major costs associated with the installation and operation of air emissions control equipment such as scrubbers, selective catalytic reduction (SCR), and electrostatic precipitators.

Q. What is the magnitude of the environmental compliance costs associated with fossil forms of electrical generation?

A. Environmental compliance costs for coal-fired generation are typically several hundred million dollars per facility. Even for natural gas-fired facilities, these costs are normally in the tens of millions of dollars.

Q. Will carbon costs be applied to nuclear power?

A. No, under either a carbon tax or cap-and-trade regime, carbon costs would only be imposed on the use or combustion of carbon and the resulting emissions of CO_2.

Q. Will a nuclear power plant require the installation and operation of air emissions control equipment such as scrubbers, selective catalytic reduction (SCR), and electrostatic precipitators?

A. No, again because a nuclear plant would not have the air emissions that a traditional fossil plant has. Thus, nuclear power plants would not have to incur the expenses associated with this equipment.

Q. Does this conclude your testimony?

A. Yes.

BY MR. BURNETT:

Q Do you have a brief summary, Mr. Kennedy?

A I do.

My name is Michael Kennedy. I'm a Principal Environmental Specialist at Progress Energy Service Company. I submitted prefiled testimony regarding air emissions issues, including greenhouse gas emissions. I'm available to answer any questions that you may have.

MR. BURNETT: Thank you.

Sir, we tender him for cross.

CHAIRMAN CARTER: Thank you so kindly.

Mr. Brew, you're recognized, sir.

MR. BREW: Thank you, Mr. Chairman.

CROSS EXAMINATION

BY MR. BREW:

Q Good morning, Mr. Kennedy.

A Good morning, Mr. Brew.

Q Mr. Kennedy, I'd like to start at Page 15 of your prefiled, if you have it.

A I'm there.

Q Line 13.

A Yes.

Q And that line says, "Based on the information available to me now, I have prepared reasonable estimates as to what costs may arise from GHG-producing facilities." Do you

see that?

A Yes, I do.

Q And do I understand that your task was to develop reasonable estimates of carbon compliance costs that you used based on external studies?

A That's correct.

Q These weren't studies that you actually performed.

A That is correct.

Q And you selected studies based on expert sources that you considered credible?

A I assembled as much data as I could find from generally credible sources, and it was a number of studies, of course, and assembled them. Yes.

Q And the studies that you selected were sources, for your exhibits were sources that you considered expert, credible sources?

A Yes.

Q Okay. And the, the 60-year price curves that the company uses for its nuclear economic benefits analysis are based on the CO2 compliance, in part on the CO2 compliance costs that you developed in your exhibits; is that right?

A Well, I provided these potential carbon cost curves out to 2050 and that's what I provided to the, to the modelers.

Q Okay. So to be more specific, on your Exhibit JMK-3 --

A Yes.

Q -- which shows four cost curves from the period of roughly 2011 to 2050, those, those are the curves that you supplied for that analysis?

A That's correct.

Q And those cost curves are then reflected in what is Appendix I to the Need Study?

A I did not develop Appendix I. I provided the cost curves. So in terms of confirming that those are the curves in the Appendix, I provided the curves. I believe they were translated to that appendix.

Q Okay. So the -- because Appendix I gives specific dollar values for a period of years; is that correct?

A Yes. That's part of Mr. Crisp's study or what he's sponsoring.

Q Okay.

A And I believe that those numbers were derived from the curves.

Q Okay. That's just -- I'm just trying to make sure we're talking about the same number. So on the Need Study when it refers to the Lieberman-Warner CO2 per ton values, that should correlate to your Lieberman-Warner curve on JMK-3?

A Yes. And let me explain that a little bit. At the time that we performed this study, which is the January/February time frame, Lieberman-Warner had been

introduced late summer, early fall. It was the latest available congressional bill at that time, and CRA was the only entity that had studied it in any detail at that time. So this Lieberman-Warner curve is the CRA study.

Q Okay. So if we, if we back up a page to Page 2 of 3 of your exhibit --

A Yes.

Q -- the Table of Sources refers to the -- the last item is the CRA forecast study from the Lieberman-Warner Bill that a Dr. Anne E. Smith provided in testimony before the Senate Environment and Public Works Committee back in November 2007.

A Correct.

Q That was your source.

A Yes.

Q Okay. And that study looked at CRA's economic analysis of what was then the pending Lieberman-Warner Bill?

A Well, it had been introduced at that time. It had not gone through committee yet, which it did in December.

Q Okay. So it has subsequently gone through committee?

A It went through committee, I believe it was December 6th, and it's scheduled for floor debate in the Senate on June 2nd.

Q Thank you. That was my next question.

A So it is the vehicle.

Q Did, did CRA update its analysis of that bill?

A It has. After, after the bill went -- while the bill went through committee there were some minor changes to it. CRA has since performed another analysis. I'll also point out that EPA has performed an analysis on the bill, as has EIA. So there's a great deal of attention to that bill now.

Q Okay. The EIA analysis that was performed in April, does that go out to 2050?

A No, it does not. It goes to 2030.

Q Did you use any studies that only go out to 2030?

A I did not.

MR. BREW: Okay. I've circulated, Mr. Chairman, copies that you all should have of a series of slides that are entitled "Economic Analysis of the Lieberman-Warner Climate Security Act of 2007 Using CRA's MRN-NEEM Model" dated April 8th.

BY MR. BREW:

Q Mr. Kennedy, do you have a copy of that?

A Yes, I do.

Q Thank you.

CHAIRMAN CARTER: Commissioners, this will be marked for identification as number sixty -- no, wait. Actually Number 70. Number 70.

MR. BURNETT: Excuse me, Mr. Chairman. Just a question more than an objection. This is an incomplete copy of

this presentation. I didn't know if that was intentional or if Mr. Brew had the full document.

MR. BREW: I do not have the full document because I was trying to save paper. But we can go through the specifics, through the questions.

MR. BURNETT: Thank you.

CHAIRMAN CARTER: Okay. Mr. Brew.

BY MR. BREW:

Q Okay. First, looking at the summary page, this summary of findings was also prepared by Dr. Anne E. Smith as far as you know?

A I'm still looking for the summary page.

Q Oh, first page, very front. I'm sorry. Her name is at the bottom of the front page. Go back. You've gone one too far. Right at the top.

A Introduction?

Q No. No. Right in front.

A Oh, you mean just the title page. Okay.

Q Yeah.

A Summary of -- I mean, it's a title page that is entitled "Summary of Findings." Yes.

Q Okay.

A It's not the summary page.

Q Sorry. I'm sorry. I got ahead of myself.

And the next page, which is Page Number 2, indicates

that "CRA's approach to modeling 2191 and summarize the results of this analysis," and states that the summary was prepared for the National Mining Association. Do you see that?

A I see that.

Q Would you have any reason to expect an analysis prepared for the National Mining Association to underestimate the cost of CO2 compliance costs?

A I wouldn't have any reason to, to question the analysis one way or the other. CRA is a well-respected firm and they have done, performed analyses for a number of clients.

Q Okay. Okay. Turning to the next page, it describes the changes they've made from their prior analysis, do you see that, and states that the analysis supersedes their prior results released in 2007?

A Yes. I see that.

Q Okay. And the next page, which is, is not sequential, it's Page 8 of this summary, discussed the scenarios that were considered in CRA's modeling?

A I see that.

Q And that this now includes features added by the Energy Bill H.R.6, which is now known as the Energy Independence and Security Act of 2007?

A Yes. Those are the additions that were made in committee.

Q And that includes increased CAFE standards for motor

vehicles?

A I know that that's one of the amendments. Yes.

Q Okay. And established a Renewable Fuel Standard?

A Again, yes, I understand that's one of the amendments.

Q And adopted various electricity end-use efficiency standards?

A Correct.

Q Okay. And that the -- their analysis further adds the features that were actually adopted in the S.2191 reported by the Environment and Public Works Committee.

A Correct.

Q And that would include allowance banking; do you know?

A I know that, well, I know that there's a great deal of discussion about this bill and there's been discussion about how much banking should be allowed, how much international offsets should be allowed. So there's a number of discussions about it. But I do know that the basic bill allows some banking, yes.

Q Okay. The basic bill allows some banking. The basic bill allows domestic offsets?

A Yes, I believe it does.

Q Okay. Now if you can turn to the last page, which is listed "Summary of Results."

A Yes.

Q Now that shows results in 2007 dollars according to the table. And I want to refer you to the last line, which is "CO2 Allowance Prices - With Banking." Do you see that?

A Yes.

Q And that shows for the, under the column year 2020, it shows an estimated cost of $61 a ton?

A In 2007 dollars, yes, that's correct.

Q And for 2040 it's $131 a ton?

A Again, yes, in 2007 dollars.

Q And in 2050 that's $195 a ton.

A Correct.

Q That's what they show as their current estimate of those costs.

A That's one of their scenarios. Yes.

Q Okay. And the other scenario is allowance prices without banking.

A Correct.

Q Okay. But the -- and what I'm asking about now is what's in the actual Lieberman-Warner Bill, which would be to allow allowance banking; is that correct?

A That's -- yes. That's one feature.

Q Okay. So can you tell me how your estimate of CO2 allowance prices in 2050 of $651 a ton compares to the CRA estimate of $195?

A Well, for one thing, you have to convert -- I plotted things in nominal dollars. I plotted the data in nominal dollars. That makes a significant difference.

Q $500 a ton?

A I'm sorry?

Q It will make a difference of over $400 a ton?

A Yes. It's not exact. But if you double that 2050 figure, you're in the ballpark of what the nominal dollars would be. It might be more than double.

Q So if I doubled the $195, I'm under $400 a ton in 2050?

A Again, this is one scenario. And, in fact, all of these studies studied multiple scenarios. So we plotted everything, picked a low, two middles and a high.

Q Oh, but this -- I'm just, I'm just looking at the source you used, which is a CRA.

A And this is a study that was subsequent to the, to the --

Q Right.

A -- what we plotted.

Q Right. But using the CRA, same source, using their same model, using their inputs from what was actually adopted in the Energy Independence and Security Act of 2007 and what the Environment and Public Works Committee has adopted gives numbers that are at least $100 to $150 a ton less than what you

show for 2050; is that correct?

A Well, it made it through committee. It has a ways to go. It has to be considered in Congress.

Q Well, I'm not asking you to speculate on the status of the bill. I'm just asking you is their updated number substantially lower than what you showed on your chart?

A Yes. But I'm not speculating. Again, there are many scenarios, there are many bills. The Lieberman-Warner Bill is the bill that is the vehicle right now. It may not be the vehicle a year from now. There could be another bill that supersedes it. I know that Senator Boxer (phonetic) is working on a bill, Senator Voinovich is working on a bill. There are bills -- there's activity on the House side. There have been bills that have been introduced that are more restrictive than Lieberman-Warner such as the Boxer-Sanders Bill. So it is the bill that is being discussed right now, but it's difficult to say what the final form of any of these bills would be if it's adopted.

Q Oh, I understand. But my question was just using your source updated, using their same model, the number is a lot lower; is that right?

A Using their model for this particular scenario. If you use their model for the no banking scenario, which is still a possibility, you would get allowance prices in the neighborhood of $700 per ton, which is higher than what we have

on our graph.

Q And all of the analyses that you've reviewed show substantially higher prices for CO2 allowances if there's no banking; is that right?

A I don't know how much banking was included in any of these analyses.

I would also point out that EPA, shortly after we introduced or submitted our need, EPA finalized an analysis of the Lieberman-Warner Bill, and the numbers are very similar in terms of projected carbon costs. They are doing another revision of that as we speak.

Q Does the EPA -- do you have the EPA's study?

A I have seen the EPA study. I don't have it with me.

Q Does the EPA study go out past 2030?

A Yes. It goes to 2050.

Q Okay. And it projected various scenarios?

A Yes.

Q Okay. If I can refer you back one page on the exhibit in front of you, which is labeled Page 18, that shows the CRA estimate of CO2 allowance costs under S.2191 with and without banking. Do you see that?

A Yes. That's a graphical representation of the table on the last page.

Q And that shows, would you agree, that allowance costs rise dramatically with no banking compared to the banking

scenario?

A Yes. And that depends on the level of banking that you assume.

Q And do you think that Congress will take that into account when it finally addresses the legislation?

A Congress has to take many things into account when they're debating bills.

Q Would this be one of those things?

A That may be one factor that they look at. Yes.

Q Because this is a factor that really drives CO2 prices, doesn't it?

A Actually the emissions caps that are set nationally are the biggest driver. Banking is one driver.

Q Okay. That's, that's fine.

One of the other sources that you referred to on your exhibit is an MIT study.

A Yes.

Q And from Page 2 of 3, you list that as the -- you used MIT low, mid and high forecasts from a report labeled "Assessment of U.S. Cap-and-Trade Proposals, Report No. 146." Do you see that on your exhibit?

A Correct. I do.

Q Earlier I handed you a copy of a report labeled "Assessment of U.S. Cap-and-Trade Proposals, Report No. 146," dated April 2007. Is that the report to which you refer?

A That's the report, although the copy you handed me is incomplete. It doesn't have Appendix C, the full Appendix C on it.

Q Okay.

A It's actually a 95-page report.

Q I was --

CHAIRMAN CARTER: Just for a moment and for clarity of the record, let's just mark this for identification as Exhibit Number 71, Commissioners.

THE WITNESS: If it matters, that's part of my response to production of documents already.

CHAIRMAN CARTER: I beg your pardon?

THE WITNESS: It's part of my response to production of documents.

CHAIRMAN CARTER: Do you want to use it --

MR. BREW: Mr. Chairman, again to save paper, the document that I circulated was just the cover sheet and the appendix showing prices. What I showed -- what I was asking Mr. Kennedy about was the entire report.

CHAIRMAN CARTER: Okay.

MR. BREW: So I just wanted to verify we were talking about the same thing.

CHAIRMAN CARTER: Okay. We'll just mark this just for ease, for ease and convenience. All right? Can we do that?

MR. BREW: That would be fine. Let me describe that.

CHAIRMAN CARTER: Okay.

BY MR. BREW:

Q What I've circulated, Mr. Kennedy, also is a two-page document which is a cover sheet to that report.

A Yes, I see that.

Q And it is also Page 68 of that report. Do you see that?

A Yes.

MR. BREW: And, Mr. Chairman, I'd ask that we mark that as an exhibit for identification just -- well, you said the report is already in the record in the composite exhibit?

THE WITNESS: The full report is. The, this copy that you handed me still is missing about 30 pages.

BY MR. BREW:

Q Okay. But what I wanted to talk about was the pricing piece.

A Okay.

Q Okay.

CHAIRMAN CARTER: We've got it marked as Exhibit 71 for identification purposes.

MS. FLEMING: Mr. Chairman, if I may interject.

CHAIRMAN CARTER: You're recognized.

MS. FLEMING: This complete report is part of Mr. Kennedy's first response to staff's first set of PODs

Number 3, and that's included in the Composite Exhibit Number 13 that's been identified in this exhibit. So we need -- I don't believe we need to mark this as a separate exhibit.

MR. BREW: There's no need, no need to mark it. It was just for ease of reference.

CHAIRMAN CARTER: Okay. Ease of reference. Okay. So we've got a spot for 71. We'll hold that open.

Thank you, Ms. Fleming.

Mr. Brew, you may continue.

MR. BREW: Thank you.

BY MR. BREW:

Q Mr. Kennedy, you referenced the MIT low, mid and high forecast in your summary of table of sources; is that right?

A That's correct. We plotted those data as well.

Q And then on your Page 3 of 3 you selected the MIT Study - Mid; is that right?

A Yes.

Q And the MIT Study, the low, mid and the high, refer to carbon reduction targets?

A Yes. In fact, they did a number of scenarios, many more than just a low, mid and high, and they refer to scenarios in terms of the total tonnage of CO2 emitted.

Q So the mid, the mid case is the one with 203 BMT or billion --

A Billion metric tons.

Q Tons. Okay.

A And that's for the period that goes out to 2050. It's a cumulative number.

Q Right. So if I wanted to find the estimated CO2 prices for the mid case, which is the 203 BMT, those numbers would be shown for the core case on Page 68, which is the page that I referred you to; is that right?

A Yes.

Q Okay. And in 2050 on that chart under the heading of "Economy Wide Indicators," at the end of that listing there's a CO2 price number.

A Correct.

Q And that shows an estimated price in 2050 of $161.49; right?

A In 2005 dollars.

Q 2005 dollars.

Okay. Other than adjusting the dollars from your studies to get nominal dollars, did you make any further adjustments for features such as banking offsets?

A No. I simply took -- the studies themselves studied or evaluated those variables. I simply took the results of the studies and plotted them, again, trying to establish the range of potential carbon costs in the future, and not assigning any particular probability to any particular scenario, just plotting them and then using a low, middle and high.

Q So you didn't apply any of your expertise in terms of what those values should be. You simply took the study results and tried to put them in a consistent format.

A Yes. I simply took study results and made no judgments on those study results.

MR. BREW: Okay. Thank you. That's all I have.

CHAIRMAN CARTER: Thank you.

Let me -- before we leave, Mr. Brew, Ms. Fleming, on this -- well, let me ask Mr. Brew. This document that we just marked for identification as Number 70, "Economic Analysis of the Lieberman-Warner Climate Security Act of 2007 Using CRA's MRN-NEEM Model, Summary of Findings," is this, this document, is this part of our record already, Ms. Fleming?

MR. BREW: It is not part of the record already.

CHAIRMAN CARTER: Do you want to make it part of the record?

MR. BREW: I'd like to move it into the record. Yes, please.

CHAIRMAN CARTER: Well, Ms. Fleming, I guess what we'll probably need to do, Mr. Burnett, you can chime in also, is that if we do that, we probably want to introduce the entire report itself.

MR. BREW: I would be happy to provide the entire summary of the findings, the entire report. I can produce that, too, but that's going to be lengthy. I was hoping simply

to use the summary of the findings just for ease of reference.

CHAIRMAN CARTER: Mr. Burnett?

MR. BURNETT: Yes, sir. Thank you. Also I would note that this, this is incompetent as evidence because neither David Montgomery or Anne Smith are here to be cross-examined on it. It's not been sponsored through any witness. It's completely unverified and authenticated.

Again, this is sort of the same predicament we were in yesterday. Mr. Brew has asked questions, the witness has given testimony on it, but this document is wholly unauthenticated, it's not sponsored by a witness, likely contains hearsay, and at this point remains incomplete.

MR. BREW: Actually this, this report is based on analysis provided, referenced by the witness. It's simply an updated version of what he relied on in his exhibits. So the only way to test his analysis from his source is to provide their, their summary of the updated analysis.

CHAIRMAN CARTER: Staff?

MS. HELTON: Mr. Chairman, it seems to me that Mr. Burnett, if he had a problem with the authenticity of the document or the verification of the document, that he should have objected contemporaneously when Mr. Brew began cross-examining the witness. So I don't think that those are viable objections to raise at this time.

With respect to the hearsay argument, in Chapter

120.57(1)(c) the Administrative Procedures Act states that "Hearsay evidence may be used for the purpose of supplementing or explaining other evidence, but it shall not be sufficient in itself to support a finding unless it would be admissible over objection and civil actions."

My recommendation to you, Mr. Chairman, is to admit the exhibit and then we shall give it the weight that it deserves.

CHAIRMAN CARTER: Okay. With that being the case, Commissioners, it may help us if we had the whole report. And so, Mr. Brew, you could submit this as a late-filed exhibit, and we'll hold a place in line, Ms. Fleming, at Number 70, Number 70 for this.

MS. FLEMING: Number 70.

MR. BREW: We will have that, that complete summary delivered to everyone tomorrow.

(Late-Filed Exhibit 70 identified for the record.)

CHAIRMAN CARTER: Okay. Thank you.

Staff, anything further on this? I wanted to clear this before we moved further. Thank you, Mr. Brew. Thank you, Mr. Burnett.

Mr. Jacobs.

MR. JACOBS: Thank you, Mr. Chairman.

CROSS EXAMINATION

BY MR. JACOBS:

Q Good morning, Mr. Kennedy.

In your testimony, I believe it's at Page 11 at the bottom of the page.

A I'm there.

Q You indicate that one of the mechanisms that has been assessed in addressing greenhouse gas emissions has been renewable portfolio standards. Is that, is that correct?

A Well, and this is in the context of there are a number of proposals in Congress. Some would implement a renewable portfolio standard at the national level, others do not. So there's a wide variety of possibilities. But, yes, this is correct in that some of them would require a renewable portfolio standard.

Q And have you done any analysis as to the impact of a renewable portfolio standard?

A I have not. I, I, again, I assembled analyses that were performed by, you know, as part of studies. I assembled the results of the studies that were available to me.

Q Okay. If you would, let's move over in your testimony to Page 14.

A I'm there.

Q Just one moment. Beginning at Line 14, you're citing to testimony given in a prior case. And I assume that you're adopting the position that, that was, that was put forward in that, in that prior testimony that, that nuclear is the

preferred alternative for addressing environmental regulation and greenhouse gas emissions. Is that a correct statement?

MR. BURNETT: Objection. Mischaracterization, vague and confusing.

BY MR. JACOBS:

Q What is, what is the purpose of your cite here in your testimony in Lines 14 through 16, Mr. Kennedy?

A This is an additional perspective regarding the air pollutant emissions resulting from nuclear generation, which is basically zero.

Q Have you taken a position as to whether or not nuclear is the best only option to address greenhouse gas emissions?

A Not the only option, no. It, it is one option.

Q Okay.

A And it's an option that does not generate greenhouse gas emissions.

Q Have you undertaken any analysis which, which attempts to qualify and quantify a portfolio of resources that will be most cost-effective in addressing greenhouse gas emissions?

A I have not personally undertaken such a study.

Q A little further down, let me get there, Page 15 of your testimony.

A Okay.

Q Beginning at Line, at Line 17 you talk about how you arrived at your estimate of greenhouse gas costs, regulatory costs. And just, just above that you talked about how you arrived at those estimates, and you speak about how nuclear, you distinguish nuclear from other fossil fuel generation sources; is that correct?

A Yes. There are two things going on here. I evaluated the life cycle emissions or, rather, cited a study that evaluated life cycle emissions from nuclear comparing it to other generating technologies. And I also assembled data regarding the potential costs of greenhouse gas emissions in the future as a result of bills that are in Congress right now.

Q Okay. In your analysis of costs, did you compare -- well, I guess I already have the answer to that. You didn't do any comparison between nuclear and renewable portfolio standards or other issues such as that; is that correct?

A No. Embedded in the studies that I assembled are many assumptions and scenarios, including of what you speak.

Q Okay. And that goes to my question.

In assessing the overall regulatory cost and cost-effectiveness of a particular measure, practice of avoidance of greenhouse gas emissions, it would be, you would look at the idea of avoided costs, would you not, as well as an assumption?

A Well, I did not perform the cost analysis. I simply

provided the potential greenhouse emissions costs.

Q Okay. And who -- I'm sorry.

A Mr. Crisp could, could help you answer that question.

Q Okay. Okay. Would, would, would it be a fair conclusion that in assessing those costs it would be clear that certainly renewable portfolio standards would not impose technical requirements, some technical requirements that a nuclear plant would impose, specifically transmission and other kinds of technical requirements? Is that -- do you agree with that statement?

MR. BURNETT: Objection. Lack of foundation. The witness just testified that's Mr. Crisp's testimony, if anyone's.

MR. JACOBS: I thought he -- if I may, Mr. Chairman. I thought his testimony was that he could speak more to how the cost analysis was done. I'm talking about technical analysis at this point.

CHAIRMAN CARTER: One second. Ms. Helton.

MS. HELTON: Just one second.

Mr. Young, who is evidently listening a little bit better than me, suggested that the witness said he could talk about the technical aspects of this. So it seems to me that the question is appropriate.

CHAIRMAN CARTER: Okay. You may proceed.

BY MR. BREW:

Q Should I restate it?

A Well, actually, actually I can't talk about the technical aspects of an RPS. I believe Mr. Masiello or Mr. Niekum would have covered that.

Q So in your testimony then when you discuss how you arrived at estimates of greenhouse gas costs, those are really, those are really provided to you by Mr. Crisp and his, and his team?

A No. I assembled external studies that provided that information.

Q I see. One final line of questioning. On Page 16 of your testimony, I'm sorry, beginning at Line 12, here you discuss the consequences of various proposals to address greenhouse gas. Would it be a fair statement to conclude that that analysis does not include the idea of renewables and any aspect of their technical competence in addressing greenhouse gas?

A I'm sorry. You've lost me.

Q My apologies.

A There seems to be a lot going on in your question.

Q In your assessment, in your assessment here where you're addressing the consequences of various proposals, is it a fair conclusion that this does not include an analysis of renewable portfolio standards?

A I, I would say basically no because I assembled external studies, all of the external studies available that ran each of them running a number of scenarios. Embedded in those scenarios are various assumptions regarding renewable portfolio standards, allowance allocation versus auction, cap-and-trade versus tax, the, the amount of nuclear that may or may not be built. So there are a number of assumptions and variables and varying scenarios that they ran.

Q Okay.

A So embedded in that is an RPS analysis. I did not perform the analysis. I took the results of these studies and then plotted them.

Q Do you have -- can you explain to me -- and that's exactly the next question -- how that analysis, the conclusion that that analysis reaches as to the impact of the proportion of nuclear generation that's being proposed in this proceeding would have on development of a renewable portfolio standard in Florida?

A I have no idea.

MR. JACOBS: Okay. Thank you. No further questions.

CHAIRMAN CARTER: Thank you.

Commissioners, before I go to staff, Commissioner Argenziano, you're recognized.

COMMISSIONER ARGENZIANO: Thank you.

Mr. Kennedy, on Page 9 of your testimony in regards

to the, I guess question two at the top with the life cycles, comparison of the life cycle of the nuclear power plant.

THE WITNESS: Yes.

COMMISSIONER ARGENZIANO: And I know that during its operation a nuclear power plant emits no CO2. That's correct; right? And several times either at hearings or we hear that people come up and say, well, it doesn't, there's no CO2 but there's CO2 in the construction. So what I'm trying to decipher is your, I guess, comparison of the life cycle of the nuclear plant to the life cycle of the PV power.

THE WITNESS: Yes.

COMMISSIONER ARGENZIANO: What is the life cycle of the PV power?

THE WITNESS: Well, the life cycle emissions of all of these technologies, and, of course, that's JMK-2, the exhibit, includes the cost of construction or manufacturing, whatever the case may be.

COMMISSIONER ARGENZIANO: Okay.

THE WITNESS: Includes the cost of mining fuel, if that's involved, transportation of the fuel, operation of the facility and final decommissioning or disposal, whatever it might be. So it really is a cradle-to-grave type of analysis.

COMMISSIONER ARGENZIANO: Right. And what I'm trying to get at is is the grave a lot farther for the nuclear power plant than it is for the photovoltaic? Because what I'm

reading here is that the, the emissions are actually greater for, to create the photovoltaic in the creation with the silicon and all that, I don't know all the particulars, but what I've read in here is actually there's more -- and I'll read it. "In fact, the life cycle emissions from nuclear power are lower than those from solar photovoltaic power, because a great deal of emissions are associated with the preparation of the pure silicon that is needed for PV panels."

So I guess what I'm getting at is if the life cycle of the nuclear power plant is much greater than the photovoltaic panel and you're still getting more emissions from the construction of the panel, then, then that says something to me that even though there's some emissions during construction of a nuclear power plant, there seems to be more with the panels.

THE WITNESS: And if I could give you a two, a two-pronged answer to that.

COMMISSIONER ARGENZIANO: Yes.

THE WITNESS: On the second page of JMK-2 I assembled a table that includes the assumptions that went into the studies that resulted in that graph. And the solar PV, the lifetime is 20 to 30 years. That was what was assumed in these studies. The nuclear lifetime is 30 years. Now and then there's, of course, the question of proportion: How much electricity are you getting from a solar PV panel versus how

much are you getting from a nuclear power plant? So there's a, there's a very large, of course, difference there.

COMMISSIONER ARGENZIANO: So but even with, I mean, with that difference, then basically what you're saying is that you, during the construction, not operation, during the construction the solar, the PV power actually has more emissions even though there are differences in the power that you're actually producing.

THE WITNESS: Correct. On a -- and it's important to note that that's a pounds of CO2 per megawatt hour basis.

COMMISSIONER ARGENZIANO: Okay. Thank you.

CHAIRMAN CARTER: Commissioner Skop, you're recognized, sir.

COMMISSIONER SKOP: Thank you, Mr. Chairman.

To that same question or point that Commissioner Argenziano raised with respect to the expected lifetime or expected economic useful lifetime of the nuclear plant, is 30 years shown in the table actually based on, you know, current history in the U.S. fleet an accurate number? Is that number low? And if, in fact, if that number were low, would the, how would that change the results? Would that make that even more in favor of lowest life cycle CO2 emissions?

THE WITNESS: Well, 30 years is the, the number that was used in these particular studies for whatever reasons that those researchers had. If you did lengthen that, I mean, if

they had assumed a 50- or 60-year lifetime, that increases the denominator, yes, and that decreases the overall life cycle emissions on a per megawatt basis.

COMMISSIONER SKOP: Thank you.

CHAIRMAN CARTER: Thank you.

Staff?

MS. KLANCKE: Staff has no questions for this witness.

CHAIRMAN CARTER: Commissioners, anything further?

Okay. Mr. Burnett?

MR. BURNETT: Nothing, sir. We would move his testimony and Exhibits 40 through 43.

CHAIRMAN CARTER: Okay. Commissioners, on their exhibit list there will be Exhibits Number 40, 41, 42 and 43. Any objections? Without objection, show it done.

(Exhibits 40 through 43 admitted into the record.)

Commissioners, I'm looking at -- now do we need Mr. Kennedy back?

MR. BURNETT: No, sir.

CHAIRMAN CARTER: Okay. Thank you, Mr. Kennedy. You may be excused.

Commissioners, let's take a break for our court reporter. I'll go with the clock on the wall this time. And what about we come back at 10 after. We're in recess.

(Transcript continues in sequence with Volume 5.)

STATE OF FLORIDA)
: CERTIFICATE OF REPORTER
COUNTY OF LEON)

I, LINDA BOLES, RPR, CRR, Official Commission Reporter, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorneys or counsel connected with the action, nor am I financially interested in the action.

DATED THIS 23rd day of May, 2008.

Linda Boles

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