

State of Florida



# Public Service Commission

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**-M-E-M-O-R-A-N-D-U-M-**

**DATE:** March 10, 2008

**TO:** Office of Commission Clerk (Cole)

**FROM:** Division of Economic Regulation (Brown, Bulecza-Banks, Garl, Graves, Hewitt, Lester, McNulty, Springer, Stallcup, Wu) *ABJ*  
Office of the General Counsel (Fleming, Brubaker, Klancke) *WBM*

**RE:** Docket No. 070650-EI – Petition to determine need for Turkey Point Nuclear Units 6 and 7 electrical power plant, by Florida Power & Light Company.

**AGENDA:** 03/18/08 – Regular Agenda – Posthearing Decision – Participation is Limited to Commissioners and Staff

**COMMISSIONERS ASSIGNED:** All Commissioners

**PREHEARING OFFICER:** Skop

**CRITICAL DATES:** 135 day deadline for final decision per statute extended to March 18, 2008, Agenda Conference

**SPECIAL INSTRUCTIONS:** None

**FILE NAME AND LOCATION:** S:\PSC\ECR\WP\070650.RCM.DOC

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### Case Background

On October 16, 2007, Florida Power & Light Company (FPL) filed a petition for a determination of need for the proposed Turkey Point Nuclear Units 6 and 7 (Turkey Point 6 and 7), pursuant to Section 403.519, Florida Statutes (F.S.), and Rule 25-22.080, Florida Administrative Code (F.A.C.). FPL's proposal consists of two nuclear-fueled generating units with in-service dates of 2018 and 2020. FPL is considering two different design alternatives for the nuclear units: the Westinghouse AP1000 (Westinghouse) and the General Electric Economic Simplified Boiling Water Reactor (GE). The Westinghouse design has a nominal output of approximately 1,100 mega-watts (MW) per unit, while the GE design has a nominal output of

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1,520 MW per unit. Depending on the technology selected, the proposed unit additions will contribute between 2,200 and 3,040 MW of new generation to FPL's system.

Pursuant to Section 403.519(4), F.S., the Commission is the sole forum for the determination of need for new nuclear power plants. In making its determination, the Commission must take into account the need for electric system reliability and integrity, the need for fuel diversity and supply reliability, the need for base-load generating capacity, the need for adequate electricity at a reasonable cost, and whether the proposed plant is the most cost-effective alternative available. The Commission must also expressly consider whether renewable energy sources or conservation measures taken by or reasonably available to the utility might mitigate the need for the proposed plant.

Intervention was granted to the following parties: (1) Office of Public Counsel (OPC),<sup>1</sup> (2) Florida Municipal Electric Association (FMEA),<sup>2</sup> (3) Florida Municipal Power Agency (FMPA),<sup>3</sup> (4) JEA,<sup>4</sup> (5) Orlando Utilities Commission (OUC),<sup>5</sup> (6) Seminole Electric Cooperative, Inc. (Seminole),<sup>6</sup> and (7) Bob and Jan Krasowski (Krasowski).<sup>7</sup>

**Public Testimony:** In addition to the prefiled testimony submitted by the applicants, the Commission received mailed comments and heard live testimony from public witnesses. Public testimony was first heard at a service hearing in Miami on January 9, 2008. In addition, the public was provided the opportunity to provide testimony at the formal administrative hearing in Tallahassee on January 30, 2008. Below is a list of the topics of interest voiced in the public testimony portion of the hearing and a reference to where they will be addressed within staff's recommendation:

- System Reliability and Integrity – Issue 1
- Fuel Diversity – Issue 2
- Reasonable Costs for Electricity – Issue 4
- Environmental Compliance Costs – Issues 4 and 6
- Conservation/Demand Side Management/Renewables – Issue 5
- Cost-Effectiveness – Issue 6

Other areas of interest that were discussed during the public testimony phase of the hearing focused on subjects beyond the scope of this proceeding established under Section 403.519, F.S., or this Commission's jurisdiction under its authorizing statutes. Those interests are listed below:

**Environmental Concerns:** Citizens voiced concerns about greenhouse gas emissions, radioactive wastes, and the water supply.<sup>8</sup>

<sup>1</sup> Order No. PSC-07-0965-PCO-EI, issued December 4, 2007.

<sup>2</sup> Order No. PSC-08-0059-PCO-EI, issued January 28, 2008.

<sup>3</sup> Order No. PSC-08-0060-PCO-EI, issued January 28, 2008.

<sup>4</sup> Order No. PSC-08-0062-PCO-EI, issued January 28, 2008.

<sup>5</sup> Order No. PSC-08-0058-PCO-EI, issued January 28, 2008.

<sup>6</sup> Order No. PSC-08-0057-PCO-EI, issued January 28, 2008.

<sup>7</sup> Order No. PSC-07-1019-PCO-EI, issued December 28, 2007.

<sup>8</sup> Witnesses Lee, Shirreffs, Oncavage, Roff, Smith, Rock, Ehat, Gilbert, Messer, Showen, Parsons, and Draper.

**Health Issues:** Concerns of overall health, possibly resulting from being exposed to plant radiation were raised.<sup>9</sup>

**Safety Concerns:** Safety concerns regarding plant security and the threat of terrorist acts.<sup>10</sup>

**Economic Development:** Proponents of the plant testified to economic benefits the plant would provide resulting in a boost to the economy of Dade County.<sup>11</sup>

Section 403.519, F.S., authorizes the Commission to examine FPL's projected costs for environmental controls necessary to meet current state and federal environmental requirements (See Issue 6). The public testimony regarding environmental concerns and health issues falls under the Department of Environmental Protection's (DEP) jurisdiction.

While staff believes the Commission's ability to address all issues raised in the public testimony is limited by the scope of Section 403.519, F.S., and other statutes which establish the Commission's jurisdiction, these other concerns may be relevant in the certification proceedings before DEP, the Division of Administrative Hearings, and the Governor and Cabinet, sitting as the Siting Board.

A formal administrative hearing was held on January 30 through February 1, 2008. During the hearing, a preliminary matter regarding a proposed stipulation to Issue 7, stated below, between FPL and FMEA, FMPA, JEA, OUC, and Seminole was discussed and approved by the Commission. (EXH 94, TR 48) As a result of stipulated Exhibit 94, FMEA, FMPA, JEA, OUC, and Seminole were excused from the hearing. (TR 48, EXH 94) On February 15, 2008, post-hearing briefs were filed by FPL, OPC (Issues 6 and 9), the Krasowskis, JEA, and Seminole. Briefs were not filed by FMPA, FMEA, or OUC.

### Stipulation

The Commission found that the following stipulation on Issue 7 reached by FPL, FMEA, FMPA, JEA, OUC, and Seminole, was reasonable and thus approved the stipulation:

FPL has had initial discussions with FMEA, FMPA, and OUC regarding any mutual benefits that may accrue from joint participation in Turkey Point Units 6 & 7. No later than July 1, 2009, FPL will continue its good faith discussions with FMEA, FMPA, and OUC, and will also commence good faith discussions of joint participation in Turkey Point Units 6 & 7 with JEA and Seminole. FPL will report the status of such ongoing status discussions to the FPSC every quarter thereafter. The results of these ongoing status discussions shall be reported to the FPSC as part of a docket which will be opened by the FPSC pursuant to its authority under the Grid Bill as codified in the Florida Statutes, in order to provide the parties with such rights and remedies as may exist to the extent of the

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<sup>9</sup> Witnesses Olsen, Smith, Wilansky, Gilbert, Showen, Parson.

<sup>10</sup> Lee, Olsen, Sipp, Roff, Smith, McGonigle, Wilansky, Johnson, Rice, Showen, Flint., Parson.

<sup>11</sup> Rodriguez, Knowles, Griemsman, Johnson, Jacobs, and Redlich.

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FPSC's jurisdiction thereunder. FPL, FMPA, FMEA, JEA, OUC and Seminole each agree that such docket to be opened by the Commission pursuant to its Grid Bill authority is the sole forum for raising issues concerning joint participation in Turkey Point 6 and 7. FMPA, FMEA, JEA, OUC and Seminole each agree not to intervene or otherwise participate directly or indirectly in section 366.93, Florida Statutes, cost recovery proceedings for the purpose of addressing joint participation in Turkey Point 6 and 7. Nothing in this stipulation is intended to imply that ongoing status discussions necessarily will lead to an agreement among any of the parties for joint participation in Turkey Point 6 and 7 or that any party is obligated to enter into any such agreements.

Staff notes that OPC and the Krasowskis were not parties to this stipulation; thus, Issue 7 is still a viable issue as to those parties, and will be addressed in the staff recommendation.

The Commission has jurisdiction over the subject matter of this proceeding pursuant to Sections 366.04(2)(c) and (5), 403.507(4), and 403.519, F.S.

### Executive Summary

Pursuant to Section 403.519(4), F.S., the Commission is the sole forum for the determination of need for new nuclear power plants. In making its determination, the Commission must take into account the need for electric system reliability and integrity, the need for fuel diversity and supply reliability, the need for base-load generating capacity, the need for adequate electricity at a reasonable cost, and whether the proposed plant is the most cost-effective alternative available. The Commission must also expressly consider whether renewable energy sources or conservation measures taken by or reasonably available to the utility might mitigate the need for the proposed plant.

No nuclear power plants have been constructed in Florida since FPL placed St. Lucie 2 in service in 1983. Rather, the state as a whole relied on the construction and purchase of coal-fired generation through the 1980s and turned to low-cost natural gas-fired generation throughout the 1990s up until present. FPL's reliance on natural gas-fired generation has increased from approximately 24% in 1998 to approximately 50% in 2006. During this same time frame, FPL's average retail rate, including fuel cost recovery, increased approximately 56%. If FPL continues its heavy reliance on natural gas, FPL ratepayers may experience higher rates in the future with the majority of costs to be recovered through FPL's fuel adjustment charge. Pursuing nuclear generation will help FPL maintain a balanced fuel supply which will result in less volatile total fuel costs over time.

Much has been done at the federal and state level to promote the development of new nuclear generation. The Energy Policy Act of 2005 provided three programs to benefit new nuclear plant development. If the nuclear project meets specific development and construction milestones, the utility may be eligible for a form of "risk insurance" to cover some construction delays, a loan guarantee program to reduce lending costs, and production tax credits that would become effective upon commercial operation. The licensing process at the Nuclear Regulatory Commission (NRC) has been streamlined to consider standardized designs and has combined the approval of a construction and operating license. Even with the streamlined procedure, the NRC process can take up to five years to complete and costs in excess of \$150 million. Therefore, the decision to pursue nuclear generation must be deliberate and based upon long-term benefits to a utility's customers.

In an effort to mitigate the economic risks associated with the long lead time and high capital costs associated with nuclear power plants, the Florida Legislature enacted Sections 366.93 and 403.519(4), F.S., during the 2006 legislative session. Section 366.93(2), F.S., requires the Commission to establish alternative cost recovery mechanisms for the recovery of costs incurred in the siting, design, licensing, and construction of a nuclear power plant. Such mechanisms shall be designed to promote utility investment in nuclear power plants and allow for the recovery in rates of all prudently incurred costs. Sections 366.93(3) and (5), F.S., allow a utility to request recovery of costs after a need determination has been granted and require annual cost information to be filed with the Commission. Finally, if a utility elects not to continue with the construction of a new nuclear plant, Section 366.93(6), F.S., allows the utility to recover costs prudently incurred up to the date of termination.

The Commission's decision on a need determination petition must be based on the facts as they exist at the time of the filing with the underlying assumptions tested for reasonableness. The long lead time associated with the permitting and construction of a nuclear plant means that many details of the project may not be known at the time a utility files for a determination of need. In this case, FPL has filed its determination of need over one year prior to filing for certification with DEP. Under a more traditional need determination proceeding, staff would likely recommend that the Commission defer the need determination decision until the utility was closer to filing with the DEP, and more details were known regarding the proposed power plant. However, recent legislation recognizing the unique nature of nuclear power plants urges the Commission to approach a determination of need from a slightly different perspective. Unlike more traditional need determination proceedings, the annual prudence review of actual costs and continued projected cost-effectiveness of the proposed facility will provide a forum for the Commission to continue to gather and review additional information as it becomes available.

Staff recommends that the Commission approve the need for Turkey Point 6 and 7 in order to maintain FPL's fuel diversity and to provide adequate electricity at a reasonable cost over the long term. Such a recommendation is premised on the evidence presented at the hearing, which indicates the proposed units are the most cost-effective alternative to satisfy a reliability need in the years 2018-2020. Nuclear generation would also provide a non-carbon emitting source of base-load power to satisfy the continued growth of Florida's energy needs. As with any project that is capital intensive and has a long lead time, some uncertainty remains with regard to future capital costs and fuel prices. However, unlike more traditional need determination proceedings, the fact that the Commission will review the continued cost-effectiveness of the project during annual prudence and cost recovery proceedings should provide appropriate checks and balances to ensure that construction of the nuclear units continues to be in the best interest of FPL's ratepayers.

### **Need for Power**

By the year 2020, FPL projects a need for 8,350 MW. Much of this need is driven by continued customer growth (6,740 MW) and the expiration of some existing purchased power agreements (1,610 MW). FPL plans to satisfy this need are comprised of planned demand-side management (1,899 MW), nuclear uprates (414 MW), renewable generation (287 MW), Turkey Point 6 and 7 (2,200-3,040 MW), and natural gas combined cycle capacity (2,710-3,550 MW). Even if customer growth was assumed to be zero percent for five years, the evidence indicates that FPL would be able to avoid some new natural gas generation, but would still have a reliability need for additional generation capacity by the year 2016. The table below summarizes the projected reserve margins for each of these scenarios:

**Estimated Impact on FPL's Summer Reserve Margin (%)**

Year	Reserve Margin w/ TP 6 and 7 <sup>12</sup>	Reserve Margin w/o TP 6 and 7 <sup>12</sup>	Reserve Margin No Growth in 2008-2012 <sup>13</sup>
2015	23.6	23.6	28.3
2016	20.6	20.6	19.3
2017	21.2	21.2	16.5
2018	22.9	18.6	13.9
2019	20.4	16.2	11.4
2020	21.9	13.7	8.8

**Demand Side Management (DSM) and Renewable Generation**

FPL's need for additional capacity to meet rising electricity demands cannot be satisfied with additional purchased power from renewable generation. Included in FPL's petition was the assumption that approximately 287 MW of renewable generation would be added to FPL's supply mix, even though many of the projects have yet to commit to a purchased power contract. The amount of renewable generation available was identified through a request for proposal process conducted by FPL in 2007. Likewise, additional DSM programs are not capable of deferring FPL's need for additional capacity. FPL assumed that approximately 1,899 MW of new DSM would be added to FPL's system by the year 2020. This value estimates a doubling of FPL's cumulative DSM efforts through 2007. The table above includes these values for DSM and renewable generation.

**Need for Base-Load Capacity**

By 2010, FPL will have approximately 15,235 MW of existing or certified base-load generation capacity which consists of coal (902 MW), gas-fired combined cycle (10,979 MW), and nuclear generation facilities (3,354 MW). As mentioned above, FPL's peak load is expected to increase by over 6,000 MW by the year 2020. FPL's base-load needs are also projected to increase by approximately the same amount. Even with the addition of Turkey Point 6 and 7, FPL's base-load needs will continue to be met primarily with natural gas-fired combined cycle generators. If load forecasts were to dramatically drop or the amount of DSM or renewable generation available were to substantially increase, the likely result would be the deferral or avoidance of some natural gas-fired power plants, which have not been certified to date but that are currently planned for the 2011-2016 time frame. While natural gas-fired generation may still be required in the future, the addition of nuclear power provides a non-carbon emitting source of base-load power to satisfy the continued growth of FPL's energy needs. Pursuing nuclear generation will help FPL maintain a balanced fuel supply which will result in less volatile total fuel costs over time.

<sup>12</sup> Includes previously certified nuclear uprates in 2012 and 2013 as well as new uncertified gas CC units in 2011, 2015, 2016, and 2017.

<sup>13</sup> Includes previously certified nuclear uprates in 2012 and 2013, but no new gas units.

### **Need to Maintain Fuel Diversity**

The addition of nuclear generation will maintain FPL's fuel diversity and security. In 2006, FPL generated approximately 50% of its power from natural gas and approximately 21% from nuclear power, and 18% from coal. Without the addition of Turkey Point 6 and 7, FPL's generation mix is projected to climb to approximately 75% from natural gas while the amount of nuclear generation would drop to approximately 16%. The addition of 2,200 MW of capacity associated with Turkey Point 6 and 7 would increase nuclear generation to approximately 26% and natural gas to 65% by the year 2021, the first full year of operation for both units. With or without Turkey Point 6 and 7, FPL's generation from coal would drop to approximately 7% due mostly to the replacement of a purchased power contract with the Southern Company (165 MW of coal capacity) and a purchased power agreement with the JEA for power from the St. John's River Power Park (381 MW of coal capacity). Both contracts are scheduled to end in the year 2015.

In September 2005, a significant number of natural gas production facilities in the Gulf of Mexico were shut down as a result of Hurricanes Katrina and Rita. FPL incurred approximately \$88 million in costs to replace a portion of the firm gas that was curtailed as a result of the storms. If FPL continues its heavy reliance on natural gas, FPL ratepayers may experience higher rates in the future with the majority of costs to be recovered through FPL's fuel adjustment charge. Pursuing nuclear generation will help FPL maintain a balanced fuel supply which will result in less volatile total fuel costs over time.

### **Cost-effectiveness**

Even though nuclear operating costs are very low, the capital costs for a nuclear plant are substantial. This situation results in an initial increase in total costs until the lower operating costs can offset the higher capital costs. In a need determination for more traditional fossil-fuel plants, cost-effectiveness would be measured by comparing various revenue requirement scenarios with and without the proposed generating unit. The revenue requirements would include the capital costs of the proposed generating plant as well as the system fuel costs. The capital cost estimates for a new nuclear plant vary greatly, largely because a new nuclear plant has not been built in Florida since 1983. In order to test the risk associated with this capital intensive project, FPL performed a break-even analysis for the costs of nuclear generation compared to either combined cycle or IGCC technology. Such a break-even analysis shows the highest capital costs for which nuclear generation would still be cost-effective.

FPL calculated a revenue requirement stream with the proposed nuclear units assuming a \$0/kw capacity cost for the nuclear units. FPL then compared this revenue stream to a traditional revenue stream which included capital and system fuel costs for a combined cycle unit as a replacement for the nuclear units. FPL also performed this analysis using an Integrated Gasification Combined Cycle (IGCC) unit as a replacement for the nuclear units. As with prior need determination filings, FPL performed these analyses under a wide range of scenarios which combined varying fuel forecasts (low, medium, and high) and environmental compliance cost projections, ENV I-IV. As discussed in greater detail in Issue 4, ENV I represents a low compliance cost scenario while ENV IV represents a much higher compliance cost scenario. In



total, nine different scenarios were analyzed. The present value savings over the study period were then used to back into a capital cost estimate of what the nuclear units could cost and still break-even with regard to savings. Comparing the resulting break-even capital costs to the estimates made from more traditional methods (vendor quotes, negotiations, etc.) gives an indication of the likelihood the project will produce net savings over the study period. Turkey Point 6 and 7 are projected to produce savings in 17 of the 18 scenarios considered. Such results indicate a high likelihood of FPL's ratepayers realizing net benefits over the life of the project. Turkey Point 6 and 7 are projected to produce annual fuel savings of over \$1 billion dollars starting in 2021 and about \$94 billion over the life of the units when compared to a combined cycle alternative based on the medium gas/ENV II scenario. As environmental compliance costs increase, so do the benefits associated with Turkey Point 6 and 7 because nuclear generation is considered a "non-emitting" technology for GHG emissions.

FPL performed this analysis for a study period equal to the expected life of the new units, 2060. Nuclear power plants have an initial licensed operating life of 40 years with the potential to renew the operating license for another 20 years. Therefore, the fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding. Overall, the analysis indicates that Turkey Point 6 and 7 have a high likelihood of providing net savings to FPL's customers over a variety of fuel and environmental cost scenarios.

It is prudent for a utility to analyze whether it is in the best interests of its ratepayers to participate in a proposed power plant before, during, and after construction of a generating unit. If conditions change from what was presented at the need determination proceeding, then a utility would be expected to act prudently. For example, updated environmental compliance cost estimates were presented at the hearing. The updated values indicate even greater savings associated with the addition of Turkey Point 6 and 7. Therefore, an analysis similar to FPL's break-even analysis should be provided as part of FPL's annual request for prudence and cost recovery to insure the continued cost-effectiveness of Turkey Point 6 and 7.

### **Advance Forging Reservation**

An additional issue addressed at the hearing was whether FPL should commit, prior to the completion of the first annual prudence review in 2008, to making advance forging reservation payments for certain long lead procurement components of the proposed generating units. More specifically, the issue addresses whether FPL should commit to making approximately \$16 million in forging reservation payments to Japan Steel Works in order to preserve the potential for 2018 and 2020 in-service dates for the units.

Advance forging reservation payments must be made years in advance of the manufacture of ultra-large forgings for nuclear reactors. FPL expects that it would have to make the forging reservation payments in June 2008, after reactor design selection is complete, in order to maintain the proposed 2018 and 2020 in-service dates. Japan Steel Works holds an effective monopoly for such forgings. The commercial arrangements for advance forgings reservations are still being negotiated between FPL's intermediary, Westinghouse, and Japan Steel Works. Westinghouse's negotiations with Japan Steel Works indicate that FPL's reservation payments for the forgings for two AP1000 reactors would be approximately \$8

million to \$12 million, in 2007 dollars. FPL has added an additional \$4 million for uncertainties in the underlying estimates provided by Westinghouse for a total estimated of \$16 million. Forging reservation payments would possibly be tradable.

Nuclear power plant construction is an essential component of meeting the state's long term electric reliability requirements, as reflected in Chapter 366.93, F.S. FPL should take all reasonable steps to meet the proposed in-service dates. Staff agrees with FPL and OPC that, if the Commission grants FPL's petition to determine the need for the proposed generating units, careful scheduling of the construction of the components of a nuclear power plant is essential in order to maximize the potential for achieving the proposed in-service dates of the units. A critical part of the scheduling is to secure large forgings manufacturing space, which FPL has shown requires advance reservation payments to be made, either directly or indirectly, to the sole supplier of such forgings, Japan Steel Works.

FPL should take all reasonable steps to meet the in-service dates of the proposed units, including committing to make advanced forging reservation payments. However, all specific contractual terms including the final price, portability, and other compensating aspects should be addressed in the annual cost recovery proceeding.

### **Conclusion**

Much has been done at the federal and state level to promote the development of new nuclear generation. In an effort to mitigate the economic risks associated with the long lead time and high capital costs associated with nuclear power plants, the Florida Legislature enacted Sections 366.93 and 403.519(4), F.S. to promote utility investment in nuclear power plants and allow for the early recovery of all prudently incurred pre-construction costs.

FPL has demonstrated a reliability need for additional generation resources of approximately 6,156 MW by the years 2018-2020. Whether the proposed Turkey Point 6 and 7 are 1,100 MW (2,200 MW total) or 1,520 MW (3,040 MW total), the evidence in this proceeding indicates a reliability need in excess of the proposed nuclear power plants. Without the addition of Turkey Point 6 and 7, FPL's generation mix is projected to climb to approximately 75% from natural gas while the amount of nuclear generation would drop to approximately 16%. The addition of 2,200 MW to 3,040 MW of capacity associated with Turkey Point 6 and 7 would increase nuclear generation approximately 26% and natural gas to 65% by the year 2021, the first full year of operation for both units. Even with the addition of Turkey Point 6 and 7, FPL's base-load needs will continue to be met primarily with natural gas-fired combined cycle generators. Nuclear generation would provide a non-carbon emitting source of base-load power to satisfy the continued growth of Florida's energy needs.

As mentioned above, if the load forecast dramatically declines or the amount of DSM or renewable generation available substantially increases, the most likely result will be the cancellation of some gas-fired combined cycle plants that have not yet been certified. Staff believes that there are no additional renewable energy sources or conservation measures which could effectively mitigate FPL's need for Turkey Point 6 and 7. While the capital cost estimates for a new nuclear plant vary greatly, FPL's break-even analysis indicates that Turkey Point 6 and

7 have a high likelihood of providing net savings to FPL's customers over a variety of fuel and environmental cost scenarios. The fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding.

Unlike traditional fossil fuel power plants, the process recently established by the Legislature requires the PSC to have annual proceedings to review a proposed nuclear project's continued cost-effectiveness during construction. FPL should provide the Commission, in conjunction with its nuclear cost recovery filing, an update to the break-even analysis to ensure continued cost-effectiveness of moving forward with construction of the proposed nuclear generating units. FPL should be required to file updated fuel forecasts, environmental forecasts, break-even costs, and capital cost estimates. In addition, FPL should account for sunk costs.

Nuclear power plant construction is an essential component of meeting the state's long term electric reliability requirements, as reflected in Chapter 366.93, F.S. FPL should take all reasonable steps to meet the in-service dates of the proposed units, including committing to make advanced forging reservation payments. However, all specific contractual terms including the final price, portability, and other compensating aspects should be addressed in the annual cost recovery proceeding.

### **Discussion of Issues**

**Issue 1:** Is there a need for the proposed generating units, taking into account the need for electric system reliability and integrity, as this criterion is used in Section 403.519(4), Florida Statutes?

**Recommendation:** Yes. FPL has a need for 8,350 MW of additional capacity in the 2011 through 2020 period. Regardless of the size of each unit (1,100 MW or 1,520 MW) the addition of Turkey Point 6 and 7 will provide some, but not all, of the needed capacity to maintain system reliability and integrity and meet the 20% reserve margin. Even if customer growth were assumed to be 0% for five years, the evidence shows that FPL would still have a reliability need for additional generation capacity by the year 2016. (Brown, Garl, Graves, Hewitt)

#### **Positions of Parties (Taken Directly from Briefs):**

**FPL:** Yes. Based upon a reasonable, long-term load growth forecast, FPL will need a minimum of 6,156 MW of new supply or approximately 5,130 MW of new DSM by 2020 to meet its reserve margin requirements. This need already assumes a significant amount of additional DSM, all currently committed supply projects, additional capacity from the nuclear uprates, and approximately 300 MW of anticipated renewable generation. With the Project, FPL will still need thousands of additional megawatts of generation or additional DSM to maintain a 20% reserve margin, providing the opportunity to take advantage of future developments in renewable resources and DSM.

**OPC:** No position.

**Krasowski:** No, the current and future power needs of FP&L customers can be met with greater reliability and integrity with the use of more efficient hardware to replace inefficient hardware now in use by FP&L. Maximized use of efficient lighting, building design, and appliances along with sophisticated applications of distributed energy programs can assure greater system reliability and integrity for the people of Florida. Furthermore, the graduated use of renewable technologies and generous net metering/distributive energy programs along with investments in ocean current technologies offer much great potential over the next few years for realizing reliability and integrity of the energy supply.

**JEA:** Yes. FPL has projected a need for either 6,156 MW of new capacity (power plant construction or purchased power) or approximately 5,130 MW of new DSM to meet its 20% reserve margin requirements by 2020. Turkey Point Units 6 and 7 will supply 2,200 to 3,040 MW of this needed capacity.

**Seminole:** Yes.

**Staff Analysis:** FPL argues that there is a need for Turkey Point 6 and 7 because overall system demand is expected to grow by 40%. (FPL BR 7) FPL further contends that without Turkey Point 6 and 7, the reserve margin would fall below 20% and FPL would have to rely on DSM to provide generation, which would render FPL's system less reliable. (FPL BR 8) In addition, FPL asserts that even if FPL's forecasted customer growth was lower than anticipated, the

growth rate would only slightly reduce the amount of generation that will be needed in addition to Turkey Point 6 and 7. Finally, FPL argues that by adding Turkey Point 6 and 7, the reliability of the system will be enhanced due to the fuel diversity benefits that will be realized by adding nuclear generation to its system. (FPL BR 9)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that there is a need for the proposed Turkey Point 6 and 7, taking into consideration the need for electric system reliability and integrity. (JEA BR 1; Seminole BR 1) JEA further argues that FPL has projected a need for either 6,156 MW of new capacity or approximately 5,130 MW of new DSM to meet its 20% reserve margin requirement by 2020. (JEA BR 1) Furthermore, JEA maintains Turkey Point 6 and 7 will supply 2,200 to 3,040 MW of the needed capacity. (JEA BR 1)

The Krasowskis contend that the use of more renewable technologies and generous net metering/distributive energy programs along with the investments in ocean current technologies offer a greater potential for realizing reliability and integrity for energy supply. (Krasowski BR 10) The Krasowskis also argue that the current and future power needs of FPL customers can be met with the use of more efficient hardware; thus, the Krasowskis argue that there is not a need for Turkey Point 6 and 7. (Krasowski BR 6) The impact of renewable generation is discussed in Issue 5.

Staff reviewed FPL's forecast assumptions, regression models, and the projected system peak demands and believes they are appropriate for use in this docket. The forecast assumptions were drawn from independent sources which the Commission has relied upon in prior cases. The regression models used to calculate the projected peak demands conform to accepted economic and statistical practices. Finally, staff believes that the projected peak demands produced by the models appear to be a reasonable extension of historical trends.

After the load forecast was established, the utility determined the timing of needed generation based upon established reliability criteria. FPL uses dual reliability criteria for generation expansion planning: loss of load probability (LOLP) and a summer reserve margin. (TR 884) Each criterion targets different aspects of the electric system. The reserve margin criterion examines the peak hour of each year, while the LOLP value takes into account daily peak hours of the year. (TR 884) If either criterion is exceeded, this situation would indicate that additional generation is needed at that particular time. For many years, FPL's reliability requirements have been driven by the reserve margin criterion. The same scenario existed in FPL's 2006-2007 reliability assessment of its projected resource needs. (TR 884-885)

During the hearing, the Krasowskis raised several questions with regard to the issue of reliability. The Krasowskis posed a question on the reliability of water, specifically nuclear's dependency on the uninterrupted hour-by-hour delivery of water. (TR 201) Witness Silva testified that water is definitely an issue with every form of generation; however, to his knowledge, water has never been an issue that affected the reliable operation of any of FPL's plants, including their existing nuclear plants. (TR 201-202) In addition, the Krasowskis questioned how FPL could project 8,350 MW of need for the period 2011-2020 even with Florida's population growth rate slowing. (TR 203) Witness Silva testified that FPL studied the average growth over several cycles of growth and its forecast of 8,350 MW for the 2011-2020

period is an adequate forecast. Witness Green testified that Florida is experiencing a slowing down in customer and population growth; however, this change reflects a cycle of increases and decreases in growth since the 1990s. (TR 584) In addition, witness Green testified that if there were a slow-down in population growth, there would still be a need for energy although maybe not at the same magnitude. (TR 585-586) As such, even with the population growth decreasing, the evidence shows that a need still exists for Turkey Point 6 and 7.

Staff performed its own analysis of customer growth to examine sensitivities of variations in growth rate, then discussed the results with witness Green during his deposition. In the most extreme case, a customer growth rate of zero was assumed for the next five years (2008-2012), followed by one year of growth at 50% of the forecasted growth. The years 2014 to 2020 remained at 100% of the forecasted growth. (EXH 15) Witness Green agreed with staff's assessment that under such a scenario, although very unlikely, FPL would have a reserve margin of only 13.9% and still need 1,395 MW of additional capacity to achieve a 20% reserve margin by the year 2018. (EXH 15)

The record shows from the period 2011 through 2020, FPL projects a need for 8,350 MW. (TR 156) Much of this need is driven by continued customer growth (6,740 MW) and the expiration of some existing purchased power agreements (1,610). FPL's plans to satisfy this need are comprised of new DSM (1,899 MW), nuclear uprates (414 MW), renewable generation (287 MW), Turkey Point 6 and 7 (2,200-3,040 MW), and natural gas combined cycle capacity (2,710-3,550 MW). Before the proposed Turkey Point units come online in 2018 and 2020, FPL intends to meet its need through uncertified new natural gas fueled generation in 2011, 2015, 2016, and 2017. (EXH 79; TR 895)

Even if customer growth was assumed to be 0% for five years, the evidence indicates that FPL would be able to avoid the new natural gas generation, but would still have a reliability need for additional generation capacity by the year 2016. The table below summarizes the projected reserve margins for each of these scenarios:

Estimated Impact on FPL's Summer Reserve Margin			
Year	Reserve Margin w/ TP 6 and 7 <sup>14</sup>	Reserve Margin w/o TP 6 and 7 <sup>14</sup>	Reserve Margin No Growth in 2008-2012 <sup>15</sup>
2015	23.6%	23.6%	28.3%
2016	20.6%	20.6%	19.3%
2017	21.2%	21.2%	16.5%
2018	22.9%	18.6%	13.9%
2019	20.4%	16.2%	11.4%
2020	21.9%	13.7%	8.8%

<sup>14</sup> Includes previously certified nuclear uprates in 2012 and 2013 as well as new uncertified gas CC units in 2011, 2015, 2016, and 2017.

<sup>15</sup> Includes previously certified nuclear uprates in 2012 and 2013, but no new gas units.

Staff, therefore, believes FPL's capacity need projections are reasonable. In addition, no party took issue with the load forecast.

FPL's need was determined after taking into account 1,899 MW of additional DSM, all other currently committed supply projects, 414 MW of recently approved nuclear capacity uprates,<sup>16</sup> and 287 MW of renewable generation, although none are yet contracted, from 2 biomass projects and 3 municipal waste-to-energy projects. (TR 886-890)

FPL's need for additional capacity to meet rising electricity demands cannot be satisfied with additional purchased power from renewable generation. Additional DSM programs and renewables are not capable of deferring the need for additional capacity. These items will be discussed in Issue 5.

In conclusion, as shown by the evidence, FPL has a need for 8,350 MW of additional capacity beginning in the 2011 through 2020 period. Turkey Point 6 and 7 will only provide a portion of FPL's need for capacity. New nuclear capacity has a long lead time before in-service due to lengthy regulation and construction timelines. Because of these long lead times associated with a new nuclear plant, many details of the project may be unknown at the time a utility files for a determination of need. As such, FPL has filed its determination of need over one year prior to filing for certification with DEP. Because Turkey Point 6 and 7 will not be in-service until the years 2018 and 2020, FPL has planned several natural gas combined cycle plants (2011, 2015, 2016, and 2017) to fulfill a portion of its need for capacity until the nuclear units come online. (EXH 79) If FPL's load forecast dramatically declines or the amount of DSM or renewable generation available substantially increases, the most likely result will be the cancellation of some gas-fired combined cycle plants that have not yet been certified. Based on this record, FPL has shown that it has a reliability need for either the 1,100 MW or 1,520 MW units in 2018 and 2020.

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<sup>16</sup> Order No. PSC-08-0021-FOF-EI, issued January 7, 2008 in Docket No. 070602-EI, In Re: Petition for determination of need for expansion of Turkey Point and St. Lucie nuclear power plants, for exemption from Bid Rule 25-22.082, F.A.C., and for cost recovery through the Commission's Nuclear Power Plant Cost Recovery Rule, Rule 25-6.0423, F.A.C.

**Issue 2:** Is there a need for the proposed generating units, taking into account the need for fuel diversity, as this criterion is used in Section 403.519(4), Florida Statutes?

**Recommendation:** Yes. If natural gas-fueled generation were to be added to FPL's system instead of Turkey Point 6 and 7, FPL's natural gas contribution to its system would increase by approximately 50% to approximately 75% by 2021. Without Turkey Point 6 and 7, FPL's dependence on natural gas would make FPL more prone to natural gas supply disruptions and to fuel price volatility. (Brown, Garl, Graves)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. The addition of Turkey Point 6 & 7 will significantly enhance fuel diversity and reduce reliance on natural gas in the state of Florida. With Turkey Point 6 & 7, it is projected that FPL's system will supply approximately 27% of its energy with nuclear, 65% with natural gas, and 7% with coal/petroleum coke. The addition of natural gas-fired combined cycle units would result in a supply of energy of only approximately 16% from nuclear, 75% with natural gas, and 7% with coal/petroleum coke. The addition of base load generation not fueled by natural gas is needed on FPL's system.

**OPC:** No position.

**Krasowski:** No, distributive generation of thermal and photo voltaic solar with solar and gas capture for agriculture are preferred methods of establishing fuel diversity over nuclear.

**JEA:** Yes. With the addition of Turkey Point Units 6 and 7, it is projected that FPL's system will supply approximately 27% of its energy with nuclear, 65% with natural gas and 7% with petroleum coke. If natural gas is used to meet FPL's 2018-2020 capacity needs, the percentage of natural gas on FPL's system will increase to approximately 75% in 2021 while nuclear fuel decreased to approximately 16%.

**Seminole:** Yes.

**Staff Analysis:** FPL argues that the addition of Turkey Point 6 and 7 will significantly enhance fuel diversity and reduced reliance on natural gas in the state of Florida. (FPL BR 10) FPL contends that by adding nuclear generation to its system, it will provide better system reliability and reduced price volatility. With the addition of Turkey Point 6 and 7, FPL asserts that it will be able to avoid continued and increased reliance on natural gas and reduce fuel price volatility for the benefit of its customers. (FPL BR 12-13)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that there is a need for Turkey Point 6 and 7 taking into consideration the need for fuel diversity. (JEA BR 1; Seminole BR 1) JEA further argues that with the addition of Turkey Point 6 and 7, it is projected that FPL's system will supply approximately 27% of its energy with nuclear, 65% with natural gas, and 7% with coal/petroleum coke. (JEA BR 1) Furthermore, JEA maintains that if natural gas is used to meet FPL's 2018-2020 capacity needs, the percentage of natural gas on FPL's system will increase to approximately 75% in 2021 and nuclear fuel will decrease to approximately 16%. (JEA BR 1)



The Krasowskis argue that there is no need for Turkey Point 6 and 7 because the generation of thermal and photovoltaic solar with solar gas capture are alternative methods for establishing fuel diversity. (Krasowski BR 6) Distributive generation of thermal and solar are renewable generation and DSM matters which are discussed in Issue 5.

In September 2005, a significant number of natural gas production facilities in the Gulf of Mexico were shut down as a result of Hurricanes Katrina and Rita. FPL incurred approximately \$88 million in costs to replace a portion of the firm gas that was curtailed as a result of the storms. (TR 701-702) If FPL continues its heavy reliance on natural gas, FPL ratepayers may experience higher rates in the future with the majority of costs to be recovered through FPL's fuel adjustment charge. Pursuing nuclear generation will help FPL maintain a balanced fuel supply which will result in less volatile total fuel costs over time.

The Commission has considered the need for fuel diversity in its evaluation of utility generation expansion plans as part of its annual Ten-Year Site Plan review process. In 2006, the Florida Legislature amended Section 403.519, F.S., to require the Commission to specifically consider the need for fuel diversity on a utility's system when evaluating a petition for need. In addition, as part of the Florida Energy Act of 2006, the Florida Legislature made changes to the siting process for a nuclear-fueled power plant in order to facilitate the construction of new nuclear generation in the state. (TR 87) The legislation included specific provisions to provide greater assurances pertaining to cost-recovery and adapting the Nuclear Power Plant Cost Recovery (NPPCR). (TR 87) Finally, Governor Charlie Crist signed Executive Order No. 07-127, which targets reductions in the level of greenhouse gas emissions. (TR 88)

The primary benefits of a more balanced fuel mix provided by the addition of Turkey Point 6 and 7 are better system reliability and reduced price volatility. (TR 699) The evidence shows that adding Turkey Point 6 and 7 are the only available non-carbon emitting alternatives that could lead to fuel diversity. (TR 192, 193) During 2006, approximately 21% of the energy produced by FPL was generated using nuclear fuel. (TR 155) Without the proposed Turkey Point 6 and 7 units, the percentage of nuclear fueled generation would decrease to approximately 16% by 2021. (TR 155, 193; FPL BR 14) In contrast, adding nuclear capacity via Turkey Point 6 and 7 would contribute to FPL's system by supplying 27% of its energy with nuclear fuel by 2021. (TR 933) Likewise, with the new nuclear plants, FPL's natural gas mix would increase from 50% to 65%. (TR 155) Replacing Turkey Point 6 and 7 capacity with equivalent combined-cycle units would result in a supply of energy of approximately 16% nuclear, about 75% natural gas, and about 7% coal/petroleum coke. (TR 193, 933) By the year 2021, regardless of the addition of Turkey Point 6 and 7 or natural gas, FPL's generation from coal would drop to approximately 7% generation reliance due to the replacement of a purchased power contract with Southern Company (165 MW of coal capacity) and a purchased power agreement with JEA for power from the St. John's River Power Park (381 MW of coal capacity). (TR 888-889, 933) Both contracts are scheduled to end in the year 2015.

FPL Witness Silva testified that an electric system that relies on a single fuel and a single technology to generate all the electricity needed to meet its customers' demand, all else equal, is less reliable than a system that uses a more balanced, fuel-diverse generation portfolio. (TR 163) In addition, Witness Silva testified that greater fuel diversity mitigates the impact of wide or

sudden swings in the price of one fuel. (TR 163) Moreover, when multiple fuels are used to produce electricity, the impact of price increases in any one fuel is lessened when that particular fuel does not make up a significant percentage of the total fuel mix. Thus, a more balanced fuel portfolio will result in less volatile total fuel costs over time. (TR 702) It is FPL asserts that pursuing new nuclear capacity will provide fuel diversity which will result in lower greenhouse gas emissions. (TR 230)

Two main components of retail rates are base rates and fuel costs. Base rates are relatively stable. Fuel costs are passed through to retail customers through FPL's fuel adjustment clause. Since fuel costs are more volatile, they are adjusted annually to reflect actual costs. The table below highlights FPL's retail rates compared to the percentage of generation from natural gas. (EXH 15)

Comparison of FPL's Retail Rate to % Generation by Gas					
	1998	2000	2002	2004	2006
Total Retail Rate ¢/kW	7.16	6.89	7.36	8.42	11.22
Base Rate %	59.4%	55.6%	49.3%	42.2%	31.2%
Fuel Costs %	26.5%	30.7%	36.5%	44.4%	54.9%
Generation by Gas %	24.2%	24.6%	32.7%	37.0%	49.4%

If FPL continues its heavy reliance on natural gas, FPL ratepayers may experience higher rates in the future with the majority of costs to be recovered through FPL's fuel adjustment charge; consequently, having a diverse fuel mix could serve as a hedge against fuel price volatility. (FPL BR 13)

In conclusion, the addition of nuclear generation will maintain FPL's fuel diversity and security. In 2006, FPL generated approximately 50% of its power from natural gas, approximately 21% from nuclear power, and 18% from coal. Without the addition of Turkey Point 6 and 7, FPL's generation mix is projected to climb to approximately 75% from natural gas while the amount of nuclear generation would drop to approximately 16%. The addition of 2,200 to 3,040 MW of capacity associated with Turkey Point 6 and 7 would increase nuclear generation to approximately 26% and natural gas to 65% by the year 2021, the first full year of operation for both units. With or without Turkey Point 6 and 7, FPL's generation from coal would drop to approximately 7% due mostly from the replacement of a purchased power contract with the Southern Company (165 MW of coal capacity) and a purchased power agreement with the JEA for power from the St. John's River Power Park (381 MW of coal capacity).

**Issue 3:** Is there a need for the proposed generating units, taking in account the need for base-load generating capacity, as this criterion is used in Section 403.519(4), Florida Statutes?

**Recommendation:** Yes. FPL's base-load needs are projected to increase by approximately 6,000 MW by the year 2020. Even with the addition of Turkey Point 6 and 7, FPL's base-load needs will continue to be met primarily with natural gas-fired combined cycle generators. (Brown, Garl, Graves)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. The proposed Project is intended to help meet FPL's growing need for additional baseload capacity, which is the essential foundation of any utility's supply portfolio. Most renewable generation resources cannot provide baseload capacity or be depended upon to be available at the time of system peak. Nuclear generation such as Turkey Point 6 & 7 is a baseload capacity option, available at all hours, which is needed to keep pace with the increasing demand for reliable power and the steady growth that the state of Florida continues to experience.

**OPC:** No position.

**Krasowski:** No, there already exists sufficient base-load. Future base load and current base load can incrementally be provided and replaced by efficiency and cleaner new renewable applications. Population decline and greater efficiencies allow current existing base-load capacity to satisfy the need.

**JEA:** Yes. Turkey Point Units 6 and 7 are base load units designed to be available continuously.

**Seminole:** Yes.

**Staff Analysis:** FPL asserts that Turkey Point 6 and 7 will help meet its growing needs for additional base-load capacity. FPL argues that most renewable generation resources cannot provide base-load capacity; thus, nuclear generation, such as Turkey Point 6 and 7, is an option which is needed in order to keep up with increasing demand. (FPL BR 14) FPL further argues that Turkey Point 6 and 7 is needed not only for system reliability and integrity, but also to enable FPL to take advantage of more renewable energy sources that are not always available. (FPL BR 14, 15) Finally, FPL contends that because Turkey Point 6 and 7 will provide base-load capacity that will operate at very high capacity levels, and FPL's least efficient generating units that emit CO<sub>2</sub> will be able to operate less, Turkey Point 6 and 7 will significantly reduce CO<sub>2</sub> emissions on FPL's system. (FPL BR 15)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that there is a need for Turkey Point 6 and 7 taking into account the need for base-load capacity. (JEA BR 1; Seminole BR 1) JEA further argues that Turkey Point 6 and 7 are base-load units designed to be available continuously. (JEA BR 1)

The Krasowskis argue that there is no need for Turkey Point 6 and 7 because sufficient base-load already exists. Furthermore, the Krasowskis contend that future base-load and current base-load can incrementally be provided and replaced by efficiency and cleaner renewable alternatives. (Krasowski BR 7) The evidence in this proceeding supports that efficient and renewable technologies currently available cannot satisfy FPL's demand for base-load capacity. This position will be addressed more in Issue 5.

While natural gas-fired generation may still be required in the future, the addition of nuclear power provides a non-carbon emitting source of base-load power to satisfy the continued growth of FPL's energy needs. Pursuing nuclear generation will help FPL maintain a balanced fuel supply which will result in less volatile total fuel costs over time. By 2010, FPL will have approximately 15,235 MW of existing or certified base-load generation capacity which consists of coal (902 MW), gas-fired combined cycle (10,979 MW), and nuclear generation facilities (3,354 MW). As previously discussed in Issue 1, FPL's peak load is expected to increase by over 6,000 MW by the year 2020. FPL's base-load needs are also projected to increase by approximately the same amount. (EXH 15) Even with the addition of Turkey Point 6 and 7, FPL's base-load needs will continue to be met primarily with natural gas-fired combined cycle generators. As discussed in Issue 1, if load forecasts were to dramatically drop or the amount of DSM or renewable generation available were to substantially increase, the likely result would be the deferral or avoidance of some natural gas-fired power plants which have not been certified to date.

The evidence reflects that the high availability rate of FPL's nuclear units means that these units would represent a substantial amount of base-load capacity on its system. (TR 101) In addition, new nuclear base-load capacity provided by Turkey Point 6 and 7 is needed to maintain system reliability and provide fuel diversity at a reasonable cost for its customers. (TR 154) FPL asserts that there is no cost-effective alternative to Turkey Point 6 and 7 that would provide the reliable base-load capacity to meet its customers' future resource needs. (TR 157-158) Turkey Point 6 and 7 will add between 2,200-3,040 MW of nuclear-fueled base-load generating capacity which is needed to keep pace with the increasing demand for reliable power and steady population growth in Florida. Some renewable generation resources available today such as wind and solar cannot provide base-load capacity. Florida has limited capacity for wind power. For example, the evidence shows that there are difficulties to using wind technology to produce energy where wind speed is sufficient to power some wind turbines. (TR 672-673) With respect to using solar energy, price and availability are impediments that cause this form of generation to be a less reliable source of base-load capacity. (TR 675) Solar is only available twelve hours per day and weather can cause the power produced by solar energy to be intermittent. The record indicates that renewable generation available today or in the near future cannot provide enough base-load capacity to avoid the need that would be met by the addition of Turkey Point 6 and 7. (TR 98)

During the hearing, the Krasowskis questioned whether FPL has ever investigated medium-sized solar plants as a means of providing base-load capacity. Witness Silva testified that FPL has investigated solar in various forms and has not been convinced that the capability exists to make solar a base-load type of generation. (TR 208) FPL has taken on a solar initiative that will result in the installation of up to 300 MW of solar energy. (TR 422-423) As discussed in Issue 1, this amount would not be sufficient to displace the need for Turkey Point 6 and 7.

In conclusion, by 2010 FPL will have approximately 15,235 MW of existing or certified base-load generation capacity which consists of coal (902 MW), gas-fired combined cycle (10,979 MW), and nuclear generation facilities (3,354 MW). As mentioned previously, FPL's peak load is expected to increase by over 6,000 MW by the year 2020. FPL's base-load needs are also projected to increase by approximately the same amount. Even with the addition of Turkey Point 6 and 7, FPL's base-load needs will continue to be met primarily with natural gas-fired combined cycle generators. If load forecasts were to dramatically drop or the amount of DSM or renewable generation available were to substantially increase, the likely result would be the deferral or avoidance of some natural gas-fired power plants, which have not been certified to date but that are currently planned for the 2011-2016 time frame.

**Issue 4:** Is there a need for the proposed generating units, taking into account the need for adequate electricity at a reasonable cost, as this criterion is used in Section 403.519(4), Florida Statutes?

**Recommendation:** Yes. The cost estimates presented for capital costs, fuel costs, emission costs, water, and waste disposal appear reasonable. (Brown, Garl, Graves, Springer, Wu)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. Based upon extensive quantitative and qualitative evaluations of alternative technologies, given current information, Turkey Point 6 & 7 is the best choice to provide reliable power at a reasonable cost and meet a growing demand for electricity. Customers can expect to realize significant fuel cost savings and environmental compliance cost savings beginning as soon as the units enter service and increasing during the units' operating lives.

**OPC:** No position.

**Krasowski:** No, reasonable cost has not been established here in relation to efficiencies and distributive energy programs. The cost of the waste storage, water costs remain a question. We already have adequate electricity. The economic costs of insuring the risks associated with an unforeseen event may be limited to FPL but extend to the overall population in the amount of billions and billions of dollars and need to be considered in the cost/risk assessment and in relationship to the other options.

**JEA:** Yes. FPL has adequately evaluated alternative technologies under a variety of fuel price and air emission compliance cost scenarios and determined that the Turkey Point Units 6 and 7 can meet its identified capacity needs at a reasonable cost.

**Seminole:** Yes.

**Staff Analysis:** FPL asserts that Turkey Point 6 and 7 will provide adequate electricity at a reasonable cost due to the significant fuel savings and environmental compliance cost savings that will be realized by its customers. (FPL BR 16) FPL contends that nuclear fuel costs are projected to be lower than fossil fuel costs and that the use of nuclear fuel will mitigate against fuel price volatility. (FPL BR 16, 17) FPL further contends that the use of nuclear technology will minimize the uncertainty and the amount of potential future environmental compliance costs associated with CO<sub>2</sub> emissions. (FPL BR 17) Finally, FPL argues that even in the unlikely case that there is no future compliance cost associated with CO<sub>2</sub> emissions, significant fuel savings would still be realized by FPL's customers. (FPL BR 18)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that there is a need for Turkey Point 6 and 7, taking into account adequate electricity at a reasonable cost. (JEA BR 2; Seminole BR 1) JEA further argues that FPL adequately evaluated alternative technologies under a variety of fuel price and air emission compliance cost scenarios. (JEA BR 2)

The Krasowskis argue that adequate electricity already exists. The Krasowskis further contend that reasonable costs have not been established based on efficiencies and conservation programs. In addition, the Krasowskis argue that water costs, including the cost of waste storage, are still questionable. Finally, the Krasowskis argue that the economic cost of an unforeseen event has not been considered by FPL. (Krasowski BR 7) Staff's analysis with regard to the water and nuclear waste storage costs is addressed below. Efficiencies and conservation programs are discussed in Issue 5.

FPL's analysis assumed overall costs of capital of 8.40% for generation-related capital costs and 8.30% for all other capital costs. (EXH 96) These rates of return are based on a capital structure consisting of 55.8% equity at a cost rate of 11.75% and 44.2% debt at a cost rate of 6.43%. A different discount rate was used for generation-related capital costs because the application of the federal production tax credit for new generation units results in a different effective tax rate for generation-related capital costs compared to other capital costs. (EXH 96) FPL used the same financial and economic assumptions for Turkey Point 6 and 7, such as the escalation rates, cost of capital, and allowance for funds used during construction (AFUDC) rates, that were used in FPL's need determination filing for capacity uprates at its four existing nuclear units approved in Order No. PSC-08-0021-FOF-EI.<sup>17</sup> (TR 882-883) There was no evidence presented in the record that disputes the reasonableness of FPL's financial assumptions. Based on this review, staff recommends that the financial assumptions used for this evaluation are reasonable.

When comparing site-specific conditions, Turkey Point 6 and 7 are projected to have higher in-service capital and operating costs than comparable CC and IGCC units. (EXH 15) In addition, the emission rates for Turkey Point 6 and 7 are zero compared to comparable CC and IGCC units. (EXH 15) FPL sets variable Operation and Maintenance (O&M) costs for nuclear as zero because nuclear fuel costs are generally characterized as fixed O&M costs or capital replacement costs, and are not analyzed on a variable basis as one would look at certain consumable costs that are common with IGCC or CC technology. (EXH 15)

#### Capital Cost Estimates

Turkey Point 6 and 7 will increase the amount of FPL's nuclear-fueled generation, eventually displacing large amounts of higher cost fossil fuel and purchase power generation with associated fuel savings for its customers. In addition, Turkey Point 6 and 7 are considered "non-emitting" technologies for greenhouse gas (GHG) emissions which will result in reduced environmental compliance costs. The process for creating a new nuclear project cost estimate differs from fossil or renewable generation projects due to a lack of a similar level of relevant market-based information and recent experience base. (TR 302)

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<sup>17</sup> Order No. PSC-08-0021-FOF-EI, issued January 7, 2008, in Docket No. 070602-EI, In re: Petition for determination of need for expansion of Turkey Point and St. Lucie nuclear power plants, for exemption from Bid Rule 25-22.082, F.A.C., and for cost recovery through the Commission's Nuclear Power Plant Cost Recovery Rule, Rule 25-6.0423, F.A.C.

To evaluate the cost-effectiveness of the proposed units, FPL developed a non-binding cost estimate range. The primary source of this non-binding cost estimate range is an interagency study conducted by an industry consortium led by the Tennessee Valley Authority (TVA) in coordination with the U.S. Department of Energy, and published in August of 2005 (the TVA Study). (TR 302) FPL determined a capital cost range of \$3,108/kw-\$4,540/kw to be reasonable for Turkey Point 6 and 7. (TR 307-308) No evidence was presented in the record to dispute the reasonableness of FPL's financial assumptions.

When compared to the combined cycle alternative, nuclear generation has higher capital cost; however, this cost is offset by nuclear's low fuel and environmental costs. When compared to the IGCC alternative, economic benefits of nuclear increase because IGCC would still have some emissions, while nuclear has none. Staff believes FPL's capital cost estimates are reasonable. No evidence was presented that challenged the cost estimates.

#### Transmission Costs

Construction of any electrical generation plant requires additional transmission infrastructure to connect the new generation source to the state's electric grid. (TR 917) A primary consideration is the capacity to be added. The transmission system must be capable of sustaining the loss of the single largest generator without violating reliability standards. (TR 855) FPL's preliminary studies determined that a new generation plant with capacity under 1,200 MW would not adversely impact the grid. If the 1,520 MW units were chosen, transmission interconnection and integration would require more detailed studies to determine the specific impacts and mitigation alternatives. (TR 863)

In conducting its cost analysis, FPL's estimate of transmission interconnection and integration costs ranged from \$664 to \$959 per kW, or \$1.5 billion to \$2.1 billion for two 1,100 MW units. (TR 308) The estimate range for two 1,520 MW units was \$2.0 billion to \$2.9 billion. These costs were included in FPL's overnight cost estimate. (TR 305; EXH 28) An estimate of \$500 million for transmission costs was used for both the CC or IGCC alternatives. (TR 918)

Staff believes FPL transmission cost estimates are reasonable. No evidence was presented that challenged FPL's transmission cost estimates.

#### Environmental Costs

In assessing the environmental compliance costs associated with FPL's petition for need, staff considered whether FPL included a reasonable level of environmental compliance costs associated with the proposed nuclear generation units and whether FPL's cost-effectiveness analysis of the selected generation alternative vis-a-vis other generating alternatives (CC and IGCC) include reasonable levels of environmental compliance costs.

FPL witness Kosky testified that FPL has identified a variety of environmental controls and associated costs for the proposed nuclear unit. FPL further asserted that its environmental compliance strategy for these units will meet, or exceed, the applicable environmental requirements. (TR 765-766)



FPL maintains that its cost-effectiveness analysis of the selected generation alternative vis-a-vis other generating alternatives (CC and IGCC) include reasonable levels of environmental compliance costs. (TR 778) Each of FPL's three alternative resource plans has different pollutant emission profiles resulting from the utilization of different fuels. In this need determination petition, the environmental compliance costs of four pollutants are considered: sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), and mercury (Hg). (EXH 96, pp. 102) In order to incorporate the range of uncertainty in its environmental cost estimates regarding future environmental requirements, FPL and its consultants analyzed the possible future environmental compliance costs based upon a report prepared by ICF International titled "U.S. Emission and Fuel Markets Outlook, 2006 edition" (2006 ICF Report). (EXH 15) FPL relied upon this report as the starting point of its environmental compliance costs forecasts. (TR 776)

In its report, ICF International reviewed the U.S. Congress bills and the international market trends regarding GHG emission regulations. ICF then analyzed the emission allowance markets for all four pollutants and presented a set of allowance pricing projections for 2006 through 2030. Each projection corresponds to a specific bill or the international market trend. ICF also provided a reference case, which was a weighted summation of all the other projections. (EXH 97) FPL adopted three ICF projections as a framework to form FPL's environmental forecasts: ENV I (mild case, based on ICF Bingaman projection), ENV II (medium case, based on ICF reference case), and ENV III (stringent case, based on ICF McCain projection). FPL extrapolated ICF's projections through 2050. To address the potential for higher CO<sub>2</sub> costs, FPL developed an additional forecast, ENV IV, in which the annual CO<sub>2</sub> values were 130% of the corresponding costs appearing in ENV III. (EXH 15) These environmental forecasts are presented in Appendix F of the Need Study. (EXH 96)

In its evaluation of resource options in this case, FPL combined its three fuel cost forecasts (high, medium, and low) with its four environmental compliance cost forecasts to form a matrix of twelve initial scenarios. After further analysis, nine scenarios were selected and utilized in performing both the economic and non-economic analyses to evaluate FPL's three resource plans. FPL eliminated three scenarios (Low Gas Cost ENV II, Low Gas Cost ENV III, and Low Gas Cost ENV IV) because FPL believes that an assumption of medium-to-high environmental compliance costs for CO<sub>2</sub> is incompatible with an assumption of low natural gas prices. (EXH 96, pp. 103) In support of this determination, FPL witness Yupp notes that one of the drivers for oil and gas prices is "the impact upon worldwide energy consumption of various factors including worldwide environmental legislation and politics." (TR 707) Witness Yupp also indicates that FPL's fuel price forecasts do not reflect a constant difference in coal and gas prices due to potential environmental legislation. (EXH 15) In addition, he indicates that medium to high environmental compliance costs are incompatible with the assumption of low natural gas prices. (EXH 15) He also testified that, if future environmental regulations were to impose high compliance costs on carbon emissions, the demand for natural gas would most likely increase. (TR 711-712) Moreover, Yupp testified that it is a reasonable assumption that, if environmental compliance costs are higher, gas prices will go up. (EXH 15)

FPL claims that the selection of nuclear technology is the best available alternative for base-load generation from an environmental perspective consistent with maintaining fuel

diversity. (TR 759) Using nuclear generating technology will help FPL reduce the total CO<sub>2</sub> emissions from its system. The estimated amount of emissions that will be avoided by the proposed nuclear units over a 40-year period of operation are 14,200 to 75,400 tons of SO<sub>2</sub>, 21,300 to 49,200 tons of NO<sub>x</sub>, and 266 million to 700 million tons of CO<sub>2</sub>. (TR 771) The estimated cumulative 40-year CO<sub>2</sub> compliance costs for alternative generation could range from \$6 billion to \$28 billion or more for CC generation, and \$17 to \$73 billion or more for IGCC generation; and the cumulative 40-year compliance costs of the other three emissions would likely be on the order of \$120 million to \$150 million for CC and \$0.8 billion to \$1.2 billion for IGCC. (TR 776-777)

During the week prior to the hearing in this docket, FPL witness Kosky received an updated ICF report titled "U.S. Emission and Fuel Markets Outlook 2007, Volume II, Emission Markets, Winter 2007/2008" (Updated ICF Report). (TR 791, EXH 102) In this report, the projections of CO<sub>2</sub> pricing were increased to reflect new GHG legislation proposals. At the hearing, OPC requested that FPL recalculate its CO<sub>2</sub> compliance costs using the updated report. (EXH 99) Witness Kosky testified that upon reviewing the resulting updated values, he concluded that the updated CO<sub>2</sub> compliance costs data provides further evidence that the range of CO<sub>2</sub> compliance costs that FPL had presented and relied upon in its economic studies were reasonable. (TR 834) FPL stated that if future CO<sub>2</sub> costs are higher than the level of costs it estimated in its resource plans (as the new ICF data indicates), due to recently proposed or future legislation, such additional costs would favor the selection of nuclear generating capacity over other generating resource options. (TR 835)

During the hearing, staff requested a late-filed exhibit that contained updated environmental compliance costs data for the remaining three emissions appearing in FPL's Appendix F of its need petition, SO<sub>2</sub>, NO<sub>x</sub>, and Hg, with the forecasts ending at 2030, the same projection horizon as used in the updated ICF report. (TR 794-795, TR 831) FPL filed an updated Appendix F, identified as EXH 103, based on the updated ICF Report. FPL agreed that as CO<sub>2</sub> allowance prices increase above FPL's forecasted future CO<sub>2</sub> allowance price levels, the allowance prices for other pollutants could decrease. (TR 829) However FPL argued that the resultant decreases of other pollutants' compliance costs would not have much of an effect on overall environmental compliance costs. Thus, as CO<sub>2</sub> allowance prices increase, overall environmental costs would be expected to increase above FPL's current projections. (TR 835)

Staff believes FPL has appropriately identified the requisite environmental controls and associated costs for the proposed nuclear units in its need petition. It appears that FPL's environmental compliance strategy for these units will meet or exceed the applicable environmental requirements, given existing and potential future environmental legislation.

Staff believes that adding new nuclear units to FPL's base-load generation would significantly reduce greenhouse gases (GHG) as well as other emissions on FPL's system, compared with adopting alternative base-load units (CC or IGCC). Nuclear generation is considered a "non-emitting" technology for GHG emissions. (TR 767) FPL has provided persuasive evidence that FPL's selection of nuclear generation will avoid significant environmental compliance costs associated with other generating alternatives' pollutant emissions. Staff believes FPL has substantiated this point by quantifying the expected cost

impacts of CO<sub>2</sub> emission regulations, the existing SO<sub>2</sub> regulations, Phase II CAIR NO<sub>x</sub> regulations, CAMR Hg regulations. Based on the environmental compliance costs shown in Appendix F of EXH 96 and EXH 103 for CC and IGCC, the emission displacement associated with the nuclear generating option should provide significant savings to FPL and its ratepayers.

Staff has reviewed the 2006 ICF Report and the Updated ICF Report. (EXH 97, 102) Staff notes that the emission allowance pricing projections developed by ICF are based upon a detailed study of the compliance cost markets for all four pollutants, nationally and internationally, and careful review of various existing or proposed emission regulations proposed by national and worldwide legislative bodies. Staff believes the methodology and the underlying data used by FPL for preparing its environmental compliance cost forecasts are reasonable. (EXH 97) Staff believes that FPL has included a reasonable level of environmental compliance costs in its resource plans for the purpose of evaluating the suitability of adding the nuclear units.

Staff considered whether FPL's decision to eliminate three scenarios from further use in its economic analysis in this need case is appropriate. Staff believes that it is reasonable to conclude that medium to high environmental compliance costs are incompatible with the assumption of low natural gas prices. Therefore, staff believes that it was reasonable for FPL to eliminate from its cost-effectiveness analysis the three scenarios in question.

Staff believes that the Commission should give the greatest weight to the analysis outcomes resulting in the Medium Gas Cost ENV II scenario for three reasons (EXH 96, p 109, 111, and 114): First, FPL's basic fossil fuel forecasts were the medium price forecasts. FPL developed one fuel price forecast for distillate and residual fuel oil, solid fuel, and natural gas which is the medium price forecast. (TR 708, 709) To develop the high and low forecasts for distillate and residual fuel oil, solid fuel, and natural gas, FPL did not separately conduct high price and low price forecasts but, instead, derived the high and low forecasts by applying factors (137% and 69%) to the medium price forecast. (TR 710; EXH 15) Therefore, among FPL's three fuel forecasts the basic fossil fuel forecasts are its medium fuel price forecasts. Second, the pollutants' emission cost projections of ENV II were developed and designated as the expected case by the well-known independent consulting firm ICF International. ICF formed its environmental compliance cost projections based upon extensive market studies and reviewing the emission regulation-related legislation as discussed above. The expected case was further created by means of weighted summation, corresponding to forecasting time, of various projections. In view of these, staff believes that the expected case (i.e. ENV II) represents a more reasonable prediction compared with its forecast counterparts. Third, the same scenario was presented in the Glades Power Park, case and it compared well with the middle scenario for emissions costs presented in that case.<sup>18</sup> (TR 785) Consequently, staff believes that it is reasonable for the Commission to place the greatest weight on the outcomes derived from the Medium Gas ENV II scenario when evaluating the overall economic analysis results. Staff agrees with FPL, however, in its decision to not apply specific probabilities to the scenarios it developed for analyzing resource options. Staff believes FPL is correct in its conclusion that

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<sup>18</sup> Order No. PSC-07-0557-FOF-EI, issued July 2, 2007, in Docket No. 070098-EI, In re: Petition for determination of need for Glades Power Park Plants Units 1 and 2 electrical power plants in Glades County, by Florida Power and Light Company.

there are too many uncertainties with regard to future environmental compliance costs and fuel costs as well as in the interaction between them to assign probabilities to specific forecasts. (EXH 15)

Staff calculated the incremental environmental compliance costs associated with the Medium Gas Cost ENV II scenario based on the Updated ICF Report's allowance prices and a static level of FPL's system emissions data for the three generation options. (EXH 103, EXH 15). Staff performed this analysis to determine whether the updated compliance cost forecast improved the economics of the nuclear generation option. The emissions compliance costs were calculated for a period from 2018, when the first proposed nuclear unit would be placed in service, through 2030, the final year of ICF's updated forecast. The results of this analysis are shown below in Table 1 Incremental Change in FPL System's Environmental Compliance Costs Resulted from the Updated ICF Forecast, 2018 to 2030. As shown, the revised SO<sub>2</sub> and Hg compliance costs decrease to a certain extent, due to the interaction between the markets of different emission compliance allowances, but the amount of reduction in SO<sub>2</sub> and Hg compliance costs does not nearly offset the incremental increase of the CO<sub>2</sub> and NO<sub>x</sub> compliance costs. (TR 830) Given the more recent environmental cost data contained in the updated ICF report, the environmental costs associated with alternatives to the proposed nuclear units (CC and IGCC) would be higher than the costs reflected in FPL's need petition, while the cost of nuclear generation would remain unchanged. (TR 835)

Table 1 Incremental Change in FPL System's Environmental Compliance Costs Based on Updated ICF Forecast, 2018 to 2030 (Medium Gas, ENV II scenario - nominal \$)			
	CC	IGCC	Nuclear
Incremental CO <sub>2</sub> costs:	\$312,306,000	\$790,497,000	\$0
Incremental SO <sub>2</sub> costs:	-\$652,271	-\$12,339,000	\$0
Incremental NO <sub>x</sub> costs:	\$1,651,936	\$120,901,442	\$0
Incremental Hg costs:	0	-\$24,291,320	\$0
Sum of Incremental Compliance Costs	\$313,957,284	\$874,768,122	\$0

During the hearing, the Krasowskis presented their concerns regarding the amount of life cycle emissions of Turkey Point 6 and 7 compared to oil, gas, and coal alternative fuels. (TR 817-818) The evidence shows that the amount of the life-cycle GHG emissions associated with a nuclear plant is less than that associated with an oil plant or a coal plant: 30 lb CO<sub>2</sub> equivalent/MWH for nuclear compared with 110 lb CO<sub>2</sub> equivalent/MWH for CC. (TR 767-768, 817) Staff agrees with the evidence presented in this case that the nuclear generation option bears the lowest amount of life-cycle emissions compared to other generating technology available in Florida. (TR 767) Moreover, life-cycle emissions for nuclear generation are low compared to non-emitting renewables and are equivalent to wind generation and are three times lower than solar generation. (TR 779)

In conclusion, staff believes that FPL has included an appropriate level of environmental compliance costs in its estimated costs for Turkey Point 6 and 7. Staff believes that FPL's forecasted costs of environmental compliance between the nuclear generation alternative compared to competing options (CC and IGCC generation technologies) are reasonable. No evidence was presented that challenged the environmental cost estimates.

#### Water Costs

Steam based plants (including nuclear technology) require more cooling water than combined cycle technology. (EXH 15) FPL estimates that a range of 60 million to 90 million gallons of water per day would be required for the operation of the proposed Turkey Point 6 and 7. (EXH 15) FPL included capital costs of approximately \$250 million to \$300 million for cooling water. (TR 335-336)

FPL has conducted a preliminary screening to determine the availability and feasibility of water resources capable of providing cooling water to the proposed Turkey Point 6 and 7. (EXH 15, Bates Stamp 000714) FPL claims that multiple viable alternatives of cooling water supply are available and will be fully investigated to determine which source or sources meet technical, environmental, and economic objectives. (EXH 15) Five supply sources are currently under review by FPL: reclaimed water from the Miami-Dade Water and Sewer Department, groundwater from the lower Floridian aquifer, groundwater from the boulder zone, marine water

taken from the surface through a remnant canal intake system, and a marine source that would be taken subsurface through a rainy well system. A final decision regarding the site certification application process to develop the alternatives as well as identify which is the best option for the facility is targeted for March 2009. (TR 335; EXH 15)

FPL contends that it has included an appropriate allocation for water supply in its cost estimate range based on FPL's significant experience in this area. (EXH 15) In response to OPC's concern whether the use of reclaimed water would cost more or less than the use of groundwater, witness Scroggs testified that the cost for the reclaimed water option would be approximately the same as the groundwater option based on FPL's discussions with the Miami-Dade Water and Sewer Department. (TR 337-338) FPL also indicated that its cost estimates include the capital costs to build the infrastructure necessary to deliver the water as well as the cost of pumping the water. (TR 343-344)

FPL's witness Scroggs testified that the source of the water to be used has not yet been determined. However, FPL believes that its cost estimate range would be sufficient to cover costs reasonably expected for any of the alternatives based on FPL's extensive knowledge of different opportunities. (TR 337) Witness Scroggs also testified "there is a significant margin above the current cost estimate range that could be tapped to support water supply projects while maintaining the cost-effectiveness of Turkey Point 6 and 7." (EXH 15)

In conclusion, staff believes FPL's costs for cooling water supply were appropriately included in the economic analyses of the three resource plans and represent a range of potential costs outcomes based upon its selection of a water supply for the proposed Turkey Point 6 and 7. (TR 340-343) Staff believes that the various water supply options available to FPL are readily available for the life of the proposed nuclear units.

#### Fuel Storage Costs

Additional costs related to spent fuel storage are exclusive to nuclear generation. Witness Villard testified that new nuclear plant designs have a spent fuel storage capacity of over ten years. (TR 734) The Department of Energy (DOE) is statutorily and contractually obligated to dispose of nuclear fuel. Further, DOE assesses FPL one mill per kilowatt hour as payment for the disposal of nuclear fuel. FPL included such costs in its economic evaluation for this need determination. (TR 732; 734; EXH 15) Witness Villard further testified that dry cask storage is a proven safe and environmentally sound on-site storage option. (EXH 15; TR 734)

Staff notes that DOE has had problems commencing operation of the Yucca Mountain nuclear waste repository, and Yucca Mountain is currently the only option. (EXH 15) However, witness Villard testified that the industry will solve the problem of long-term storage of spent nuclear fuel within the next 20 years. (EXH 15) He contends that the problem is not a technical one. Further, witness Villard testifies that he believes that the costs of dry cask storage are included in the economic evaluation for this need determination. (EXH 15) In the United States, the policy for disposal of spent nuclear fuel is final disposal as opposed to reprocessing. (TR 745)

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In conclusion, staff believes the cost estimate information presented in the record is reasonable. FPL's reliability need for adequate electricity is discussed in greater detail in Issue 1. FPL's cost estimates will be discussed in greater detail in Issue 6. Staff, therefore, believes that construction of Turkey Point 6 and 7 will not only provide adequate electricity, but also ensure the most reasonable costs to ratepayers.

**Issue 5:** Are there any renewable energy sources and technologies or conservation measures taken by or reasonably available to Florida Power & Light Company which might mitigate the need for the proposed generating units?

**Recommendation:** No. FPL has identified an incremental increase of 1,899 MW of DSM summer peak demand reduction from conservation, as well as over 280 MW of renewable energy from purchased power contracts by the year 2020. As discussed in Issue 1, FPL has demonstrated a reliability need for the years 2018 through 2020 in excess of these amounts. A reduction in peak demand or an increase in renewable generation would likely result in the deferral of future uncertified natural gas units. (Brown, Garl, Graves)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** No. Neither renewable resources nor conservation and DSM can mitigate the need for Turkey Point 6 & 7, alone or in combination. Even if renewable resources and conservation are achieved at levels far greater than expected, FPL's need for Turkey Point 6 & 7 will not be eliminated. Moreover, the addition of Turkey Point 6 & 7 will not displace the potential for increasing the use of these resources, given the scope of FPL's system needs.

**OPC:** No position.

**Krasowski:** Yes, (An assessment of the meaning of the word reasonable is seriously necessary in regard to this issue). Enormous opportunities for efficiency and conservation, distributive energy and clean technologies exist. As explained by Mr. Brandt, only a fraction of efficiencies available through DSM are realized and are available by raising Florida's minimal standards.

**JEA:** No. Even if renewable resources and conservation were achieved at levels greater than projected, FPL would still need Turkey Point Units 6 and 7.

**Seminole:** Yes.

**Staff Analysis:** FPL argues that neither renewable resources nor conservation and DSM can mitigate the need for Turkey Point 6 and 7. (FPL BR 18) FPL asserts that its projected resource need already takes into account all reasonably achievable, cost-effective DSM and renewable energy resources known to FPL. (FPL BR 19) FPL asserts that because DSM and renewable energy resources represent resource options so inherently different from Turkey Point 6 and 7 - in terms of base-load capacity, contribution to fuel diversity, and ability to reduce system-wide CO<sub>2</sub> emissions - they cannot be seen as true alternatives. (FPL BR 19) FPL contends that it continues to aggressively pursue DSM opportunities, as well as the purchase and development of substantial amounts of energy from renewable resources. (FPL BR 21) As a result, although FPL asserts that additional DSM, renewable energy resources, and new nuclear generation should all be pursued because each resource is needed, it is evident that DSM and renewable energy cannot mitigate the need for Turkey Point 6 and 7. (FPL BR 21-22)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that there are no additional renewable energy sources and technologies and conservation measures available that could mitigate the need for Turkey Point 6 and 7. (JEA BR 2; Seminole BR 1)



JEA further argues even if renewable resources and conservation were achieved at levels greater than projected, FPL would still need Turkey Point 6 and 7. (JEA BR 2) Seminole contends it is not aware of any such sources, technologies, or measures currently available. (Seminole BR 1)

The Krasowskis argue that there are renewable energy sources and technologies and conservation measures available that could mitigate the need for Turkey Point 6 and 7. In addition, the Krasowskis contend there are enormous opportunities for efficiency and conservation measures. Moreover, the Krasowskis assert that only a fraction of energy efficiencies available through DSM are realized and would become available by raising Florida's minimal standards. (Krasowski BR 7) The Krasowskis did not provide any specific conservation measures or renewable technologies that would mitigate the need for Turkey Point 6 and 7. The Krasowskis argue that additional conservation could be achieved through mandatory participation in utility conservation programs. (TR 628-640) However, such a mandate would require legislation or amendments to the building code.

According to witness Brandt, FPL used a multi-step process to develop its current DSM goals. FPL identified a total of 329 DSM measures for screening. All selected measures were screened for cost-effectiveness utilizing the Rate Impact Measure (RIM) test with the assumption of no incentives. The assumption of no incentives gives each measure the highest probability of passing the RIM test. Each measure that passed the RIM test was then tested using the Participant test. For those measures that were found to be cost-effective as determined by both the RIM and Participant tests, annual market acceptance rates, and the achievable potential were identified. The results of this analysis produced the most cost-effective DSM portfolio for FPL's customers. (TR 602-603) The energy savings from these programs were added to FPL's integrated resource planning (IRP) process. FPL's current DSM plan to meet its 2005-2014 goals was approved in Order Nos. PSC-05-0162-PAA-EG<sup>19</sup> and PSC-06-0025-FOF-EG.<sup>20</sup> (TR 604)

From 1980 through 2006, FPL has implemented approximately 3,659 MW of savings from its DSM programs. During this same time period FPL has completed over 2,360,000 energy audits of customers' homes and businesses. (TR 597-598) In 2004, FPL received Commission approval of DSM goals that will add 802 MW (at the generator) of additional DSM from 2006 through 2014. FPL plans to achieve additional demand reduction beyond the current DSM goals time frame such that an additional summer demand reduction of 1,899 MW at the generator will be achieved by 2020. (TR 594-595)

Despite FPL's efforts, an additional 5,130 MW of cost-effective, incremental DSM would be needed to meet FPL's demand needs. FPL witness Sim states that it is unrealistic to assume the existence of this amount of cost-effective, incremental DSM. (TR 891) Staff agrees in part because the availability of cost-effective DSM measures has been declining. FPL witness Brandt has identified several areas where DSM-related technologies are reaching market saturation, which directly impacting FPL's ability to increase participation in many of its DSM

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<sup>19</sup> Order No. PSC-05-0162-PAA-EG, issued February 9, 2005, in Docket No. 040029-EG, In re: Petition for approval of numeric conservation goals by Florida Power & Light Company.

<sup>20</sup> Order No. PSC-06-0025-FOF-EG, issued January 10, 2006, in Docket No. 040660-EG, In re: Petition for approval of modifications to BuildSmart Program by Florida Power & Light Company.

programs. For example, in 1982 the Florida Energy Code was changed to require all new homes to have at least R-19 levels of ceiling insulation. As a consequence, the eligible market has shrunk as more pre-1982-built homes participate in the program. In 2006, the minimum efficiency standards for Heating Ventilation and Air Conditioning (HVAC) equipment were increased. For example, the minimum standards for residential type air conditioners were increased significantly from a minimum season energy efficiency rating (SEER) of 10 to 13. (TR 599-601) FPL's load forecast includes a 1,256 MW reduction to account for the effect of the new energy efficiency standards mandated by the 2005 Energy Policy Act. (TR 608) When building code or appliance efficiency levels become the same as the utility's program, then the impact of the utility program is greatly diminished because the baseline energy efficiency level is raised. Furthermore, FPL has projected that the amount of annual load management capability is close to the maximum usable amount. (TR 599)

In addition to DSM, FPL's load forecast assumes successful contracting for and delivery of 144 MW of renewable firm capacity bid in response to its 2007 request for proposals for renewable energy, and successful extension of 143 MW of renewable firm capacity from three expiring municipal waste-to-energy contracts. (TR 888)

Most renewable resource options are unable to meet base-load generating needs, but are better positioned as intermediate and peaking resources that enable a utility to replace its gas and oil-fired generation. (TR 1005) Even with a greater emphasis on the development of renewable resources in Florida, the realities of land use economics, a relatively low level of renewable resources available, and the incompatibility of renewables that involve combustion or incineration with GHG reduction targets, make it very unlikely that the state can count on renewables to meet the bulk of its incremental power supply needs or be the principal means of providing significant reductions in GHG levels over the next ten to twenty years. (TR 1005)

In closing, witness Sim testified that a reduction in peak load demand or an increase in renewable generation would likely result in the deferral of uncertified natural gas units. (TR 973) The more immediate effect of such a change would be that the capacity need and, therefore, the capacity options that FPL would select to meet that need in the years prior to 2018 would change. (TR 973)

Based on the record, staff believes that there are no additional cost-effective conservation measures available that might mitigate FPL's need for Turkey Point 6 and 7. FPL has identified an incremental increase of 1,899 MW of DSM summer peak demand reduction by the year 2020, as well as over 280 MW of renewable energy from purchased power contracts. As discussed in Issue 1, FPL has demonstrated a reliability need in excess of these values for the years 2018 through 2020. A reduction in peak demand or an increase in renewable generation would likely result in the deferral of uncertified natural gas units. In addition, staff believes it is unrealistic to assume that FPL could achieve the amount of energy savings through DSM in ten years, that took 26 years to accomplish. As such, staff believes that there are no additional renewable energy sources or conservation measures which could effectively mitigate FPL's need for Turkey Point 6 and 7.

**Issue 6:** Will the proposed generating units provide the most cost-effective source of power, as this criterion is used in Section 403.519(4), Florida Statutes?

**Recommendation:** Yes. Despite high capital costs, the relatively low fuel costs associated with the proposed units provide an economic advantage when compared with other base-load generation alternatives. When potential environmental compliance costs are considered, nuclear generation becomes even more cost-effective when compared to other base-load generation alternatives. The fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding. FPL should be required to provide an updated breakeven cost-effectiveness evaluation as part of the annual cost recovery and prudence review process. (Brown, Garl, Graves, Lester, Wu)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. The proposed generating units are projected to provide the most cost-effective source of power, taking into account all the factors listed in Section 403.519(4). FPL's cost estimate for Turkey Point 6 & 7 includes a reasonable range for all costs, including costs associated with water supply and treatment, as well as spent fuel storage and handling. Based on reasonable projections of future fuel costs and environmental compliance costs, Turkey Point 6 & 7 is the most cost effective option, and the only option that can satisfy the factors listed in Section 403.519(4).

**OPC:** The Commission must take into account the very high probability of carbon dioxide emission regulation during the economic lives of the proposed Turkey Point Nuclear Units 6 and 7. The magnitude of carbon and other emission costs affects the determination of whether the proposed plants are cost effective compared to alternatives such as combined cycle gas plants and IGCC plants. The Commission should give greatest weight to the emission costs derived from the medium gas cost, ENV II (ICF expected) scenario for the purpose of determining whether the proposed plants are cost effective.

**Krasowski:** No, this project's costs must be compared with an equal amount of analysis to a renewable/efficiency option. The proposed nuclear project time line extends over a period that would allow the monies dedicated to the project to incrementally provide for FPL customer energy needs by the use of efficiency programs, elevated standards of power usage and investments in clean energy technologies, without the costly, problematic issues of long term toxic waste management, among other things.

**JEA:** Yes. FPL has adequately evaluated alternative technologies under a variety of fuel price and air emission compliance cost scenarios and determined that the Turkey Point Units 6 and 7 is the most cost-effective alternative available to meet its identified capacity needs in the 2018-2020 period.

**Seminole:** Yes.

**Staff Analysis:** In a more traditional need determination proceeding for a fossil-fuel generating unit, cost-effectiveness would be measured by comparing various present value revenue requirement scenarios with and without the proposed generating unit. The revenue requirements would include the capital costs of the proposed generating plant as well as the system fuel costs. The difference between competing alternatives would indicate which generation alternative was the most cost-effective.

As discussed in Issue 4, FPL prepared a capital cost estimate for new nuclear generation of \$3,108/kw-\$4,540/kw. However, due to the lack of recent cost information for nuclear power plant construction, FPL departed from a traditional revenue requirement analysis and performed a break-even analysis. (TR 302) For analysis purposes, FPL compared a present value revenue stream assuming no capital costs for the nuclear units to a traditional present value revenue stream which includes capital and system fuel costs for a combined cycle (CC) or an Integrated Gasification Combined Cycle (IGCC) as a replacement for the nuclear units. (TR 892-894) The results of this analysis show the highest capital costs at which nuclear generation would still be cost-effective compared to CC and IGCC alternatives.

As with prior need determination filings, FPL performed this analysis under a wide range of scenarios which combined varying fuel forecasts (low, medium, and high) and environmental compliance cost projections, ENV I-IV. As discussed in Issue 4, ENV I represents a low compliance cost scenario while ENV IV represents a much higher compliance cost scenario. Nine different fuel/environmental scenarios were analyzed for each alternative to the proposed Turkey Point 6 and 7, resulting in a total of 18 scenarios. The projected present value savings over the study period for each scenario was then used to calculate a break-even capital cost estimate of what the nuclear units could cost and still produce net savings over the study period when compared to either CC (Table 6-1) or an IGCC (Table 6-2). Each break-even value was then compared to the capital cost range of \$3,108/kw-\$4,540/kw to determine the likelihood of the nuclear project producing a net savings over the study period. (EXH 83) If the break-even values are higher than the current capital cost-estimates, then the nuclear plants would provide net savings over the life of the units compared to alternative base-load units. Staff believes FPL's approach in performing this analysis is reasonable.

Tables 6-1 and 6-2 illustrate that all but one of the break-even capital costs produced from FPL's analysis is above the current cost estimate range of \$3,108/kw-\$4,540/kw. (TR 310-311) These results indicate that Turkey Point 6 and 7 are projected to produce savings in 17 of the 18 scenarios. In addition, Table 6-1 shows that the only scenario which does fall between the cost estimate range is the ENV I/Low Gas scenario. However, if this scenario were to occur, the overall cost of electricity to FPL's customers would be the lowest due to the significant amount of existing natural gas-fired generation on FPL's system. (TR 179)

**Table 6-1**

Breakeven Nuclear Capital Costs Compared to Gas Combined-Cycle (\$/kw in 2007\$)				
		High Gas Cost	Medium Gas Cost	Low Gas Cost
Environmental	Env. I	6,157	4,543	3,206
Compliance	Env. II	6,701	5,065	
Cost	Env. III	6,949	5,327	
Forecasts	Env. IV	7,281	5,680	

FPL capital cost estimates \$3,108/kw-\$4,540/kw

**Table 6-2**

Breakeven Nuclear Capital Costs Compared to Coal IGCC (\$/kw in 2007\$)				
		High Gas Cost	Medium Gas Cost	Low Gas Cost
Environmental	Env. I	6,725	6,212	5,921
Compliance	Env. II	7,996	7,487	
Cost	Env. III	8,630	8,123	
Forecasts	Env. IV	9,450	8,956	

FPL capital cost estimates \$3,108/kw-\$4,540/kw

The high initial capital costs of Turkey Point 6 and 7 are offset by the relatively low operational costs of the proposed plants. During cross examination, witness Sim testified that Turkey Point 6 and 7 will produce fuel savings of over \$1 billion dollars in 2021 when compared to a combined cycle alternative. (TR 953) Witness Sim further testified that this value increases over time resulting in a savings of about \$94 billion over the life of the units. (TR 953) These statements were made using FPL’s medium gas cost projections. Overall savings can be seen as early as 2024 when compared to a combined cycle alternative. (EXH 15) The evidence shows that because nuclear fuel costs are low, the proposed Turkey Point units would still produce considerable savings with or without CO<sub>2</sub> legislation. (TR 956) As shown in Tables 6-1 and 6-2, as environmental compliance costs increase, the breakeven capital cost for Turkey Point 6 and 7 increases. As discussed in Issue 4, nuclear generation is considered a “non-emitting” technology for GHG emissions. (TR 767) Therefore, the higher the environmental compliance costs, the greater the benefits associated with Turkey Point 6 and 7. Nuclear power plants have an initial licensed operating life of 40 years with the potential to renew the operating license for another 20 years. (TR 267-268) Therefore, the fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding.

No nuclear power plants have been constructed in Florida since FPL placed St. Lucie 2 in service in 1983. The state as a whole relied on the construction and purchase of coal-fired generation through the 1980s turning to low cost natural gas fired generation throughout the 1990s up until the present. Much has been done at the federal and state level to promote the development of new nuclear generation. The Energy Policy Act of 2005 provided three programs to benefit new nuclear plant development. If the nuclear project meets specific

development and construction milestones, the utility may be eligible for a form of "risk insurance" to cover some construction delays, a loan guarantee program to reduce lending costs, and production tax credits that would become effective upon commercial operation. (TR 269) The licensing process at the Nuclear Regulatory Commission (NRC) has been streamlined to consider standardized designs and combined the approval of a construction and operating license. Even with the streamlined procedure, the NRC process can take up to five years to complete and costs in excess of \$150 million. (TR 284-288) In an effort to mitigate the economic risks associated with the long lead time and high capital costs associated with nuclear power plants, the Florida Legislature enacted Sections 366.93 and 403.519(4), F.S., during the 2006 legislative session. Section 366.93(2), F.S., requires the Commission to establish alternative cost recovery mechanisms for the recovery of costs incurred in the siting, design, licensing, and construction of a nuclear power plant. Such cost recovery mechanisms should promote utility investment in nuclear power plants and allow for the recovery in rates of all prudently incurred costs. Sections 366.93(3) and (5), F.S., allow a utility to request recovery of costs after a need determination has been granted and requires annual cost information to be filed with the Commission. Finally, if a utility elects not to continue with the construction of a new nuclear plant, Section 366.93(6), F.S., allows the utility to recover costs incurred up to the date of termination. Staff recommends that the Commission require FPL to provide an updated cost-effectiveness evaluation as part of the annual cost recovery process. FPL should also be required to file updated fuel forecasts, environmental forecasts, break-even costs, and capital cost estimates. In addition, FPL should account for sunk costs. Providing this information on an annual basis will allow the Commission to monitor the cost-effectiveness regarding the continued construction of Turkey Point 6 and 7.

FPL contends that Turkey Point 6 and 7 are projected to provide the most cost-effective source of power, taking into account all the factors listed in Section 403.519(4), F.S. (FPL BR 22) FPL asserts that its cost-estimate range for Turkey Point 6 and 7 includes a reasonable range for all costs, including costs associated with water supply and treatment, as well as spent fuel storage and handling. (FPL BR 22) FPL maintains that it developed its cost estimate range by combining information provided by an interagency study, conducted by an industry consortium in coordination with the U.S. Department of Energy, as well as with FPL's own extensive construction experience in Florida. (FPL BR 22-23) The non-binding cost estimate range for Turkey Point 6 and 7 in 2007 dollars is \$3,108 to \$4,540 per kilowatt. (FPL BR 23)

OPC asserts that although uncertainty exists about future fuel prices and emissions costs, the Commission must still make judgments about future prices and costs in order to determine the cost-effectiveness of Turkey Point 6 and 7. (OPC BR 2) In addition, OPC maintains that the medium forecast is FPL's best estimate of future fuel prices and believes the Commission should give the greatest weight to the medium fuel and environmental price forecasts when considering cost-effectiveness of the proposed plants. (OPC BR 3, 4)

JEA and Seminole contend that the proposed Turkey Point 6 and 7 will provide the most cost-effective source of power. (JEA BR 2; Seminole BR 2) Furthermore, JEA argues that FPL adequately evaluated alternative technologies under a variety of fuel price and air emission compliance cost scenarios and determined that the proposed Turkey Point 6 and 7 is the most

cost-effective alternative available to meet its identified capacity needs for the 2018-2020 period. (JEA BR 2)

The Krasowskis argue that Turkey Point 6 and 7 will not provide the most cost-effective source of power. (Krasowski BR 8) In addition, the Krasowskis contend that the cost of Turkey Point 6 and 7 should be compared with an equal amount of analysis to a renewable/efficiency option. (Krasowski BR 8) Furthermore, the Krasowskis believe that the Turkey Point 6 and 7 timeline extends over a period that would allow monies dedicated to the project to be used to provide energy needs through efficiency programs, elevated standards of power usage, and investments in clean energy technologies, without the costly issues related to toxic waste management. (Krasowski BR 8) Staff's analysis of renewable/efficiency options, can be found in Issue 5. Staff's analysis of the need for Turkey Point 6 and 7 based on electric system reliability and integrity can be found in Issue 1.

FPL's projected future costs of compliance with CO<sub>2</sub> regulations as well as the potential future compliance costs for other air emissions currently regulated under the Clean Air Act (i.e., SO<sub>2</sub>, NO<sub>x</sub>, and Hg), were developed using projected costs from ICF International's report, "U.S. Emission & Fuel Markets Outlook, 2006 edition." (TR 776) FPL adopted three ICF projections as a framework to form FPL's environmental forecasts: ENV I (mild case, based on ICF Bingaman projection), ENV II (medium case, based on ICF reference case), and ENV III (stringent case, based on ICF McCain projection). The ICF report provided the projected air emissions compliance costs through 2030. Beyond 2030, the ICF compliance costs for all air emissions were projected forward by FPL, based on a review of recent assessments related to the growing interest in CO<sub>2</sub> regulation and expected compliance costs. (EXH 15) To address higher potential CO<sub>2</sub> costs, FPL further developed another forecast ENV IV in which the annual CO<sub>2</sub> values were 130% of the corresponding numbers in ENV III. (EXH 15) OPC contends that the emission costs derived from ENV II are the most likely scenario. (OPC BR 1)

Given FPL's estimated CO<sub>2</sub> compliance costs, the 40-year compliance costs could range from \$6 billion to \$28 billion or more for combined cycle generation, and \$17 billion to \$73 billion for IGCC generation. (TR 776) The 40-year compliance costs for SO<sub>2</sub>, NO<sub>x</sub>, and mercury would be much less, due to the quantity (tonnage) of pollutants emitted, than the compliance costs for CO<sub>2</sub> and would likely be in the order of \$120 million to \$150 million for a natural gas combined cycle generation and \$0.8 billion to \$1.2 billion for IGCC. (TR 777) Staff believes that FPL's environmental compliance cost forecasts are reasonable for purposes of evaluating Turkey Point 6 and 7.

Recently, FPL received the 2007 edition ICF Internationals report, in which the projections of CO<sub>2</sub> pricing were updated to reflect new GHG legislation proposals. (EXH 102) FPL filed an updated Appendix F, for years 2008-2030, based on the newly released ICF report. (EXH 103) FPL witness Sim noted that the break-even analysis utilizing the updated Appendix F values would increase the cost-effectiveness of Turkey Point 6 and 7. (TR 962) No party contested the results of the updated CO<sub>2</sub> compliance costs.

The development of FPL's forecasted natural gas, residual fuel oil, solid fuel (coal and petcoke), and distillate fuel oil prices used in the economic evaluation of Turkey Point 6 and 7

were supported by FPL witness Yupp. (TR 708-709) These forecasts, along with the nuclear fuel price forecast, appear in the Appendix E of the Need Study. (Exhibit 96) Witness Yupp notes that the differential between fuel prices is a key driver in the overall economic outcome of each expansion plan. (TR 707) It is the differential in fuel prices that results in the \$1 billion dollar annual savings in the first year of operation of Turkey Point 6 and 7. (TR 953)

FPL uses a medium gas forecast methodology. (TR 708) The natural gas and oil price forecasts through 2020 are based on the forward curve for commodity prices and projections from PIRA Energy Group. After 2020, the prices are escalated based on real price changes from the Energy Information Administration (EIA). (TR 708) Transportation costs are added to the commodity prices. (EXH 15) For solid fuel, FPL used commodity price forecasts from JD Energy and added marine and rail transportation and terminal charges. All prices are converted to nominal dollars using the 2.5% annual escalation rate. (TR 708-709)

For residual fuel oil, natural gas, and solid fuel, FPL developed high and low price forecasts based on its experience with these commodities during January 2000 to April 2007. Witness Yupp testified that this method accounts for the uncertainty in fuel price forecasts and ensures that the evaluation of the resource plans is reasonable. (TR 710, 719-720)

FPL witness Villard forecasted the price of nuclear fuel. He notes four steps in fabricating nuclear fuel: uranium mining, conversion, enrichment, and fabrication. (TR 727-728; EXH 96) For each step, FPL forecasted the price based on inputs from nuclear fuel market experts. In general, FPL expects the demand for nuclear fuel to increase with the planned construction of new nuclear units. FPL projects that nuclear fuel supply will be adequate based on the shorter lead time for construction of new nuclear fuel mining and fabrication capacity compared to the time for constructing a nuclear plant. (TR 729-731, 744, 746-748; EXH 15) Unlike the forecasts for fossil fuel, only a single nuclear fuel forecast was used to evaluate FPL's expansion plans. The record reflects that the historical and anticipated price variability is small compared to the variability of fossil fuel prices and that no reasonable change in nuclear fuel prices would affect the fact that the units are expected to operate at full availability. (EXH 15)

As previously discussed, OPC contends that the Commission should give the greatest weight to the medium fuel price forecasts when considering cost-effectiveness of the proposed plants. (OPC BR 3-4) Staff believes FPL's fuel price forecasts are reasonable for the purpose of evaluating Turkey Point 6 and 7. Although FPL did not compare its fuel forecasts to published forecasts, the evidence supports that its forecasts are based on recognized, independent sources of forecast information. (EXH 15) Staff notes that FPL used an escalation rate, 1.14%, from the EIA forecast to forecast long term natural gas prices. In addition, forecasted fuel prices beyond the year 2030 are not available. (EXH 15) Staff believes FPL used reasonable assumptions for its fuel price forecasts because the banded approach of high, low, and medium price forecasts presents a reasonable range of price scenarios. (EXH 15)

## **Conclusion**

Much has been done at the federal and state level to promote the development of new nuclear generation. In an effort to mitigate the economic risks associated with the long lead time



and high capital costs associated with nuclear power plants, the Florida Legislature enacted Sections 366.93 and 403.519(4), F.S. to promote utility investment in nuclear power plants and allow for the recovery in rates of all prudently incurred costs.

The results of FPL's breakeven analysis indicate that Turkey Point 6 and 7 are projected to produce savings in 17 of the 18 scenarios considered. Such results indicate a high likelihood of FPL's ratepayers realizing net benefits over the life of the project. Turkey Point 6 and 7 are projected to produce annual fuel savings of over \$1 billion dollars starting in 2021 and about \$94 billion over the life of the units when compared to a combined cycle alternative. As environmental compliance costs increase, so do the benefits associated with Turkey Point 6 and 7 because nuclear generation is considered a "non-emitting" technology for GHG emissions. Nuclear power plants have an initial licensed operating life of 40 years with the potential to renew the operating license for another 20 years. Therefore, the fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding.

Unlike traditional fossil fuel power plants, the process recently established by the Legislature requires the PSC to have annual proceedings to review a proposed nuclear project's continued cost-effectiveness during construction. Staff recommends that the Commission require FPL to provide an updated cost-effectiveness evaluation as part of the annual cost recovery process. FPL should also be required to file updated fuel forecasts, environmental forecasts, break-even costs, and capital cost estimates. In addition, FPL should account for sunk costs. Providing this information on an annual basis will allow the Commission to monitor the cost-effectiveness regarding the continued construction of Turkey Point 6 and 7.

Docket No. 070650-EI  
Date: March 10, 2008

**Issue 7:** Does Florida Power & Light Company's nuclear power plant petition contain a summary of any discussions with other electric utilities regarding ownership of a portion of the plant by such electric utilities, consistent with the requirements of 403.519(4)(a)5., F.S., and Rule 25-22.081, F.A.C.?

**Recommendation:** Yes. (Brown, Garl, Graves)

**Position of Parties Stipulated Issue (Taken Directly from Briefs):**

**FPL:** Yes. FPL's petition contains a summary of discussions with other electric utilities regarding ownership of a portion of the plant, consistent with the requirements of 403.519(4)(a)5, Fla. Stat., and Rule 25-22.081, F.A.C.

**OPC:** No position.

**Krasowski:** No, and the fact that FPL's petition does not contain a summary of any discussions they had with other electric utilities regarding ownership of the portion of the plant should be rectified by FPL amending their original petition to include the required information or, if there have been no preliminary discussions as claimed, and no summary is possible, FPL should be required to withdraw their present petition and submit an accurate one starting from square one.

**JEA:** Yes. JEA, Florida Municipal Electric Association, Florida Municipal Power Association, Orlando Utilities Commission and Seminole Electric and Florida Power & Light Company have entered into a stipulation on this issue which was admitted into the record as Exhibit 94 and voted on and approved by the full Commission on the first day of hearing, January 14, 2008. [T. 45-8, 55-6] JEA hereby reaffirms its agreement to the stipulation as stated in Exhibit 94 and requests that this stipulation be included in its entirety in the final order and that notation be made that it was approved by the Commission.

**Seminole:** This issue was stipulated to by Florida Power & Light, Seminole, and the other electric utilities. The stipulation was voted on and approved unanimously by the Commission at hearing and should be included in the Final Order in this matter.

**Staff Analysis:** Section 403.519(4)(a)5, F.S., provides that an applicant's petition shall include:

[i] information on whether there were any discussions with any electric utilities regarding ownership of a portion of the nuclear or integrated gasification combined cycle power plant by such electric utilities.

Furthermore, Rule 25-22.081(2)(d), F.A.C., specifies that an applicant's petition shall contain:

[a] summary of any discussions with other electric utilities regarding ownership of a portion of the plant by such electric utilities.

The Commission approved a stipulation, as previously discussed, on this issue between FPL, FMEA, FMFA, JEA, OUC, and Seminole. (EXH 94; TR 48) As a result of the stipulation, FMEA, FMFA, JEA, OUC, and Seminole were excused from the remainder of the hearing. (TR

48, EXH 94) Staff notes that OPC and the Krasowskis were not parties to this stipulation; thus, Issue 7 remains a viable issue as to those parties. (TR 49)

In its petition, FPL states that the company has held preliminary discussions regarding potential ownership with several Florida utilities who have expressed interest in the plant. (TR 326-327) FPL argues that its petition as well as witness Scroggs' testimony address the ownership discussions that have taken place; thus, on its face, the requirements of 403.519, F.S., and Rule 25-22.081, F.A.C., have been met. (FPL BR 29)

OPC did not file a brief with respect to this issue. The Krasowskis assert that the petition does not contain a summary of discussions regarding ownership. (Krasowski BR at 8) In addition, the Krasowskis contend that others and ratepayers from other Florida utilities may have wanted to participate in this docket but were not given adequate information about discussions concerning joint ownership. (Krasowski BR at 8)

Staff believes that FPL met the requirements of Section 403.519(4)(a)5, F.S., and Rule 25-22.081, F.A.C. Witness Scroggs testified that FPL has discussed the potential for ownership participation with utilities who have expressed an interest. (TR 326) FPL has held discussions with FMPA and OUC and received an expression of interest from Seminole subsequent to this filing. (EXH 15) No evidence was presented to the contrary. Based on the stipulation of this issue between FPL and the parties mentioned previously, FPL will continue negotiations with interested parties as deemed appropriate.

**Issue 8:** Based on the resolution of the foregoing issues, should the Commission grant Florida Power & Light Company's petition to determine the need for the proposed generating units?

**Recommendation:** Yes. (Brown, Garl, Graves)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. For the foregoing reasons, as supported by the evidence presented, the Commission should grant FPL's petition to determine the need for Turkey Point 6 & 7. Turkey Point 6 & 7 is the only resource option that can provide needed base load capacity and enhance fuel diversity with zero CO<sub>2</sub> emissions. Furthermore, considering all the costs associated with new nuclear generation and a wide range of projected fuel costs and environmental compliance costs, Turkey Point 6 & 7 is expected to be the most cost-effective choice.

**OPC:** No position

**Krasowski:** No, instead we expect the Public Service Commission will continue to pursue innovative energy efficiency and conservation strategies, develop programs to increase the use of clean renewable generating options, and develop an aggressive net metering/distributive energy program, etcetera, with a broad consideration for a full range of funding mechanisms.

**JEA:** Yes.

**Seminole:** Yes.

**Staff Analysis:** FPL argues that the record shows that Turkey Point 6 and 7 is the best available base-load option to enhance fuel diversity and help FPL achieve reductions in CO<sub>2</sub> emissions. (FPL BR 30) FPL contends that the evidence demonstrates that Turkey Point 6 and 7 is the preferred alternative in nearly all future fuel cost and environmental compliance cost scenarios. Accordingly, FPL argues that based on the record evidence, the Commission should grant its petition to determine the need for Turkey Point 6 and 7. (FPL BR 30)

OPC did not file a brief with respect to this issue. JEA and Seminole contend that the Commission should grant FPL's petition to determine the need for Turkey Point 6 and 7 based on the resolution of the foregoing issues. (JEA BR 2; Seminole BR 3)

The Krasowskis argue that FPL's petition should not be granted. Instead, the Krasowskis contend that they expect the Commission will continue to pursue innovative energy efficiency and conservation strategies, and develop programs to increase the use of clean renewable generating options. (Krasowski BR 9) These concerns are addressed in Issue 5.

Staff believes the evidence presented in the foregoing issues reflects that FPL has demonstrated a need for Turkey Point 6 and 7. If FPL's petition for determination of need for Turkey Point 6 and 7 is approved, staff recommends that the Commission require FPL to provide an annual cost-effectiveness evaluation as part of the cost recovery process. FPL should also be required to file updated fuel forecasts, environmental forecasts, and non-binding capital cost estimates. In addition, FPL should account for sunk costs. Providing this information on an

annual basis will allow the Commission to monitor the cost-effectiveness regarding the continued construction of Turkey Point 6 and 7. Staff recommends the Commission approve FPL's petition for determination of need for the proposed Turkey Point units 6 and 7 for the following reasons:

First, as discussed in Issues 1 and 3, FPL demonstrated a need for additional capacity by 2018. Turkey Point 6 and 7 will add 2,200-3,040 MW of nuclear fueled base-load generating capacity which is needed to keep pace with the increasing demand for reliable power and the steady population growth in the State of Florida.

Next, Issue 2 reflects that Turkey Point 6 and 7 represents a critical component in FPL's efforts to develop fuel diversity and reduce dependence on natural gas. A more balanced fuel portfolio will result in less volatile total fuel costs over time.

In addition, as discussed in Issue 4, relatively stable nuclear fuel costs will shield ratepayers against volatile price fluctuations. Similarly, the lack of emissions during operation will guard against future environmental compliance costs.

The evidence in Issue 5 shows that despite FPL's proposed incremental increase of an additional 1,899 MW, more than 5,000 MW of cost-effective incremental DSM would still be needed to meet FPL's demand needs.

Lastly, in Issue 6, FPL's analysis illustrates a high probability of customer savings during the life of the proposed Turkey Point 6 and 7 units. Additional analyses requested by staff illustrated reasonable probability of customer savings within 20 years of commercial operation of the proposed Turkey Point 6 and 7 units. Therefore, the fuel and environmental benefits of Turkey Point 6 and 7 could continue beyond the analysis presented in this proceeding.

For the reasons discussed above, staff recommends the Commission approve FPL's petition for determination of need for Turkey Point 6 and 7.

**Issue 9:** If the Commission grants Florida Power & Light Company's petition to determine the need for the proposed generating units, should FPL commit, prior to the completion of the Rule 25-6.0423 cost recovery proceeding in 2008 (the "2008 NPPCR Proceeding"), to make advance forging reservation payments of approximately \$16 million to Japan Steel Works in order to preserve the potential for 2018-2020 in-service dates for the proposed generating units?

**Recommendation:** FPL should take all reasonable steps to meet the in-service dates of the proposed units, including committing to make advanced forging reservation payments. However, all specific contractual terms including the final price, portability, and other compensating aspects should be addressed in the annual cost recovery proceeding. (McNulty)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes. If the Commission grants the determination of need for Turkey Point 6 & 7, the Commission should state that its support for the Project includes an acknowledgement of the necessity to make this financial commitment to mitigate the risks associated with the overall project schedule. The prudence of the commercial arrangement itself, i.e., contractual terms, including price terms, portability, or other compensatory aspects will be determined in the ordinary course of the annual cost recovery proceeding.

**OPC:** It is appropriate for FPL to make a commitment of approximately \$8 million to \$16 million either directly to Japan Steel Works or through intermediaries Westinghouse or General Electric for an advance forging reservation to preserve the potential for 2018 - 2020 in service dates; however, the prudence of all aspects of the commercial arrangement itself should be determined in the ordinary course of the annual cost recovery proceeding.

**Krasowski:** It is our understanding that FP&L does not require a determination of need in this Docket (070650) to act on making a payment to reserve a cue in the line to secure the forging work they desire. We believe this issue should be addressed as provided for under The Nuclear Power Plant Cost Recovery Rule 25-6.0423 in general and Rule 25-6.0423(5) specifically. We say this issue is not appropriately placed in this Docket. The issue of the placement of the 16 million dollar queue reservation fee with Japan Steel Works or one of the other Japanese owned companies identified as the vendors does not represent the best use of FPL rate payers money to stimulate our portion of the American economy.

**JEA:** No position.

**Seminole:** Yes.

**Staff Analysis:** If the Commission approves staff's recommendation in Issue 8 to grant a determination of need for Turkey Point 6 and 7, FPL seeks concurrence from the Commission that it should proceed with making advance forging reservation payments to Japan Steel Works, either directly or indirectly, prior to the completion of the Rule 25-6.0423, F.A.C., cost recovery proceeding in 2008. According to FPL, the Commission should, in this proceeding, acknowledge the necessity for FPL to make such payments in order to mitigate the risks associated with the overall project schedule. FPL proposes that the prudence of the commercial arrangement itself, i.e. contractual terms, including price terms, portability, or other

compensatory aspects should be determined in the ordinary course of the annual cost recovery proceeding. (FPL BR 31-32) FPL further clarifies that the effect of the Commission's decision would prevent further review and consideration of whether that commitment should have been made in the time frame contemplated. (FPL BR 33-34) Finally, FPL witness Olivera stated that FPL is seeking the Commission's approval for FPL to engage in such payment commitments in order to meet the timeline of the project. (TR 140-141) FPL also states that it is not seeking a determination of the prudence of the commercial arrangements, including the contractual terms, including price terms, portability, or other compensatory aspects as part of this proceeding.

Advance forging reservation payments must be made years in advance of the manufacture of ultra-large forgings of nuclear reactors. (TR 290) FPL asserts that it would have to make the forging reservation payments in June 2008, after reactor design selection is complete, in order to maintain the proposed 2018 and 2020 in-service dates. (EXH 15) Japan Steel Works holds an effective monopoly for such forgings. (EXH 15) FPL witness Scroggs stated that the commercial arrangements for the advance forging reservations are still being negotiated. It is unclear whether payments will be remitted to a reactor designer, either Westinghouse or General Electric, or directly to Japan Steel Works. (TR 435) Westinghouse's current negotiations with Japan Steel Works, conducted on behalf of FPL, indicate that FPL's reservation payments for the forgings for two AP1000 reactors would be \$8 to \$12 million, in 2007 dollars. (TR 470-471; EXH 15) FPL estimates the forging reservation payments for Turkey Point 6 and 7 would be \$16 million. The estimate is based on the addition of \$3 million to the \$12 million estimate, as determined by FPL witness Scroggs, to account for uncertainties in the both the underlying estimate and the ultimate reactor design chosen, and an additional \$1 million due to price escalation and rounding. (TR 471; EXH 15)

Forging reservation payments could possibly be tradable. (TR 290) Forging reservation payments have been made in the past by FPL for other power plant forgings, but the forging reservation payments considered in this instance require significantly longer lead times and higher payment amounts. (TR 472-473; EXH 15)

FPL witness Scroggs stated that it is possible, but a very low probability, that FPL would make an advance forging reservation payment to Westinghouse, but then later opt for the General Electric reactor design, thereby causing FPL to have to make another advance forging reservation payment to General Electric, essentially doubling the payment from \$16 million to \$32 million. Witness Scroggs stated that if FPL were to make a final technology decision and then determined to make the advance forging reservation payment to a particular vendor, FPL would be very certain to remain with that project. Witness Scroggs also indicated that for a double payment event to occur, there would have to be no remarket value for the payment made to Westinghouse and the forging reservation contract would have to exclude terms allowing for the application of the Westinghouse reservation payment to the General Electric forgings in the unlikely event that FPL found it necessary to switch its choice of reactor designer to General Electric. (TR 440-441)

FPL witness Scroggs indicated that FPL makes its request for a prudence determination of FPL's decision to enter into advance forging reservation payments in this proceeding because FPL's decision must take place in advance of the cost recovery process established in Rule 25-

6.0423, F.A.C. He noted that formal Commission decisions on nuclear power plant cost recovery will not be rendered until as late as October 1, 2008, but the decision to make the payments must be rendered by June 2008. He further stated that FPL seeks this prudence determination at this time in an attempt to be transparent in its decision making before the Commission. (TR 344-346)

The Krasowskis assert that the matter should be addressed as provided in Rule 25-6.0423, F.A.C., in general and Rule 25-6.0423(5), F.A.C., specifically rather than addressed in this docket. The Krasowskis argue that FPL does not require a determination in this docket to act on making a reservation for its place in line for the forging work. (Krasowski BR 9)

OPC contends that it is appropriate for FPL to make a commitment of approximately \$8 million to \$16 million either directly to Japan Steel Works or through intermediaries Westinghouse or General Electric for an advance forging reservation to preserve the potential for 2018-2020 in service dates; however, the prudence of all aspects of the commercial arrangement itself should be determined in the ordinary course of the annual cost recovery proceeding. (OPC BR 7)

OPC states that, if the Commission grants FPL's petition to determine the need for this proposal, the high level of costs associated with the construction of the proposed power plants will be funded by the state's consumers of electricity. OPC argues that delays which will inflate these costs should be avoided. Thus, it is appropriate for FPL to take into account advance payments for long lead procurement items to preserve the potential for 2018-2020 in-service dates. (OPC BR 8-9)

Nuclear power plant construction is an essential component of meeting the state's long term electric reliability requirements, as reflected in Section 366.93, F.S. FPL should take all reasonable steps to meet the proposed in-service dates. Staff agrees with FPL and OPC that, if the Commission grants FPL's petition to determine the need for the proposed generating units, careful scheduling of the construction of the components of a nuclear power plant is essential in order to maximize the potential for achieving the proposed in-service dates of the units. A critical part of the scheduling is to secure large forgings manufacturing space, which FPL has shown requires advance reservation payments to be made, either directly or indirectly, to the sole supplier of such forgings, Japan Steel Works.

During the hearing, concerns were raised by Commissioners that it is premature for the Commission to address this issue in the need determination process. FPL witness Scroggs was asked several questions regarding the necessity for Commission approval of FPL's decision to enter into the advanced forgings reservation payments at this time. Witness Scroggs responded that the expenditure will fall out of the sequence of the normal prescribed cost recovery process (the NPPCR proceeding). Commissioners noted that there were other expenses that also will be incurred prior to the NPPCR proceeding which the utility will deem to be reasonable and necessary, but FPL had not asked for pre-approval of those expenses. (TR 352) Commissioners also questioned why it is necessary for the Commission to approve or direct the reservation payments if there is remarket value associated with the reservations. (TR 355) In addition,



Commissioners expressed concerns about the possibility of double payments for advanced reservation fee payments which may be required under certain circumstances. (TR 447)

Staff believes there is a basis for concluding that advance forging reservation payments for the proposed nuclear power plant should be treated differently for purposes of cost recovery compared to other expenditures in this case. Witness Scroggs indicated that the lead times for forging reservation payments for the proposed nuclear units were significantly longer than the lead times for similar reservation payments which had been paid by FPL in the past for conventional plant steam turbines and generators. The reservation payments are also unique in that there is only one supplier, Japan Steel Works, with the capability to manufacture the large forgings required for the proposed nuclear units. While reservation payments may hold remarket value, and thus mitigate to some extent the risks of making such payments, it is uncertain whether FPL would be capable of trading the reservations. In addition, FPL has shown that it is necessary to enter the queue for forging reservations as early as possible due to the growing worldwide demand competing for limited supply of manufacturing space for large forgings. (EXH 15) Further, staff believes that the Commission expects FPL to take all reasonable actions to meet the proposed in-service dates, which may include committing to other expenditures critical to the construction process prior to the conclusion of the NPPCR proceeding.

While the issues related to the costs associated with a nuclear power plant would normally be addressed in the context of the NPPCR proceedings, staff believes that in this instance, FPL's decision to engage in the payments is reasonable, subject to the review of detailed contract provisions in NPPCR proceedings. The unusually long lead times associated with the reservation payments prior to the actual manufacture of the forgings, and the criticality of the reservations to the overall project, differentiate this commitment from other more traditional contractual commitments.

No nuclear power plants have been constructed in Florida since FPL placed St. Lucie 2 in service in 1983. The state as a whole relied on the construction and purchase of coal-fired generation through the 1980s turning to low cost natural gas fired generation throughout the 1990s up until the present. Much has been done at the federal and state level to promote the development of new nuclear generation. Because of the high risk nature of construction of a nuclear power plant, it is imperative that FPL take all necessary steps to maintain the planned project schedule, including advance forging reservation payments. FPL is seeking some measure of certainty regarding the construction of its next nuclear power plant. Staff believes it is reasonable for FPL to seek assurances for the first nuclear power plant it has built in several decades.

Staff is in agreement with both FPL and OPC that all specific contractual terms, including price, portability, and other compensating aspects of such payments should remain subject to the Commission's full prudence review in future NPPCR proceedings. While evidence in the record indicates that advance forging reservation payments ultimately required for Turkey Point 6 and 7 may range between \$8 million to \$16 million based on current negotiations, staff believes the Commission should weigh all evidence available at the time of the NPPCR proceedings in determining the overall prudence of the price paid for the reservations rather than selecting an acceptable range of payment at this time.

Docket No. 070650-EI

Date: March 10, 2008

**Issue 10:** Should this docket be closed?

**Recommendation:** The docket should be closed after the time for filing an appeal has run.  
(Fleming, Klancke)

**Position of Parties (Taken Directly from Briefs):**

**FPL:** Yes.

**OPC:** No position.

**Krasowski:** Yes, this docket should be closed and FPL's petition denied due to the lack of adequate analysis of all reasonable options and the extreme risk and inability to project accurate costs which in turn stifles the development and investment in efficiency and new clean technologies.

**JEA:** This docket should be closed once any timely motions for reconsideration of the need determination final order issued in this docket have been ruled upon.

**Seminole:** Yes.

**Staff Analysis:** The docket should be closed after the time for filing an appeal has run.