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FPSC - COMMISSION CLERK

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of:

DOCKET NO. 130009-EI
NUCLEAR COST RECOVERY CLAUSE.
_____/

VOLUME 4

Pages 650 through 829

PROCEEDINGS: HEARING

COMMISSIONERS PARTICIPATING: CHAIRMAN RONALD A. BRISÉ
COMMISSIONER LISA POLAK EDGAR
COMMISSIONER ART GRAHAM
COMMISSIONER EDUARDO E. BALBIS
COMMISSIONER JULIE I. BROWN

DATE: Monday, August 5, 2013

TIME: Commenced at 2:48 p.m.
Concluded at 5:03 p.m.

PLACE: Betty Easley Conference Center
Room 148
4075 Esplanade Way
Tallahassee, Florida

REPORTED BY: JANE FAUROT, RPR
Official FPSC Reporter
(850) 413-6732

APPEARANCES: (As heretofore noted.)

I N D E X

WITNESSES

EXHIBITS

NUMBER:		ID.	ADMTD.
115	FPL Ten-Year Site Plan, excerpt	779	827
116	FPL 2012 DSM Annual Report, excerpt	779	827
117	Customer Economic Benefit Crossover Timeline	788	
118	PSC Review of the 2012 Ten-Year Site Plans, excerpt	794	827
119	Sensitivity Analysis with Zero CO2 Compliance Costs	802	
56-60 and 81			826

P R O C E E D I N G S

(Transcript follows in sequence from Volume 3.)

CHAIRMAN BRISÉ: FPL, call your next witness.

MS. CANO: FPL calls Doctor Steven Sim.

(Pause.)

MS. CANO: May we proceed?

CHAIRMAN BRISÉ: Yes, you may.

MS. CANO: Thank you.

STEVEN SIM, Ph.D.

was called as a witness on behalf of Florida Power and Light Company, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MS. CANO:

Q. Good afternoon, Doctor Sim. You were sworn in a few moments ago, right?

A. Yes.

Q. Okay. Would you please state your name and business address for the record?

A. Steve Sim; business address, 9250 West Flagler Street, Miami.

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

A. Florida Power and Light Company as Senior Manager of Integrated Resource Planning.

Q. Did you prepare and cause to be filed 35 pages of Prefiled Direct Testimony in this proceeding on May 1st, 2013?

A. Yes.

Q. Do you have any changes or revisions to your Prefiled Direct Testimony?

A. No.

Q. And if I were to ask you the same questions contained in your Prefiled Direct Testimony, would your answers be the same?

A. They would.

Q. Did you also prepare and cause to be filed 30 pages of Rebuttal Testimony in this proceeding?

A. Yes.

Q. And that Amended Rebuttal Testimony was filed on July 26th, 2013?

A. That's correct.

Q. Do you have any changes or revisions to your Prefiled Amended Rebuttal Testimony?

A. No.

Q. And if I were to ask you the same questions contained in your Prefiled Rebuttal Testimony, would your answers be the same?

A. They would.

MS. CANO: Chairman Brisé, FPL asks that the

Prefiled Direct and Prefiled Amended Rebuttal Testimony of Doctor Sim be inserted into the record as though read.

CHAIRMAN BRISÉ: Okay. At this time we will enter the Prefiled Direct Testimony and Prefiled Rebuttal Testimony of Doctor Sim into the record, seeing no objections.

Making sure -- Mr. Cavros, making sure that you are with us? (Pause.)

Okay. Seeing no objections on the testimony? Okay.

BY MS. CANO:

Q. Okay. And, Doctor Sim, you also prefiled exhibits in this proceeding, and those were SRS-1 to SRS-9 to your Direct and Exhibit SRS-10 to your Rebuttal Testimony?

A. That's correct.

MS. CANO: And, Mr. Chairman, I would just note that these have been premarked for identification as Exhibit Numbers 52 through 60, and 81.

CHAIRMAN BRISÉ: Okay. Thank you.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

DIRECT TESTIMONY OF STEVEN R. SIM

DOCKET NO. 130009-EI

May 1, 2013

Q. Please state your name and business addresses.

A. My name is Steven R. Sim, and my business address is 9250 West Flagler Street, Miami, Florida 33174.

Q. By whom are you employed and what is your position?

A. I am employed by Florida Power & Light Company (FPL) as Senior Manager of Integrated Resource Planning in the Resource Assessment & Planning department.

Q. Please describe your duties and responsibilities in that position.

A. I supervise and coordinate analyses that are designed to determine the magnitude and timing of FPL's resource needs and then develop the integrated resource plan with which FPL will meet those resource needs.

Q. Please describe your education and professional experience.

A. I graduated from the University of Miami (Florida) with a Bachelor's degree in Mathematics in 1973. I subsequently earned a Master's degree in Mathematics from the University of Miami (Florida) in 1975 and a Doctorate in Environmental Science and Engineering from the University of California at Los Angeles (UCLA) in 1979.

While completing my degree program at UCLA, I was also employed full-time as a Research Associate at the Florida Solar Energy Center during 1977 - 1979. My responsibilities at the Florida Solar Energy Center included an evaluation of Florida consumers' experiences with solar water heaters and an analysis of potential renewable energy resources including photovoltaics, biomass, wind power, etc., applicable in the Southeastern United States.

In 1979 I joined FPL. From 1979 until 1991 I worked in various departments including Marketing, Energy Management Research, and Load Management, where my responsibilities included the development, monitoring, and cost-effectiveness analyses of demand side management (DSM) programs. In 1991 I joined my current department, then named the System Planning Department, where I held different supervisory positions dealing with integrated resource planning. In late 2007 I assumed my present position.

Q. What is the purpose of your testimony?

A. The primary purpose of my testimony is to present the results of the 2013 economic analyses for the new FPL nuclear units, Turkey Point 6 & 7, using updated assumptions and addressing 7 scenarios of future fuel cost and environmental compliance cost forecasts. In my testimony I will refer to these analyses as the 2013 feasibility analyses for the Turkey Point 6 & 7 project. The results of these analyses were that the Turkey Point 6 & 7 project is projected to be the economic choice in 5 of these 7 scenarios.

In addition, I will briefly discuss FPL's portfolio approach in resource planning and the role of additional nuclear energy in that portfolio approach. I will also discuss the assumptions used in the 2013 feasibility analyses. I will also present the results of additional analyses that further quantify the projected benefits of the Turkey Point 6 & 7 project. Finally, I will briefly discuss the recently completed Extended Power Uprate (EPU) project, particularly the types of benefits that the project is already delivering to FPL's customers and which it will continue to deliver to FPL's customers for decades to come.

The 2013 feasibility analyses of the Turkey Point 6 & 7 project are presented to satisfy the requirement of Subsection 5(c)5 of the Florida Administrative Code Rule 25-6.0423, Nuclear Power Plant Cost Recovery which states "By May 1 of each year, along with the filings required by this paragraph, a utility shall submit for Commission review and approval a detailed analysis of the long-term feasibility of completing the power plant." Other feasibility-related topics for the Turkey Point 6 & 7 project are discussed by FPL Witness Scroggs.

Q. Please summarize your testimony.

A. Completion of the two new nuclear units, Turkey Point 6 & 7, continues to be projected as the economic choice for FPL's customers in new feasibility analyses using updated assumptions. The results of FPL's 2013 feasibility analyses indicate that completing the project is projected to be economic for

FPL's customers in the majority (5 of 7) of scenarios analyzed. The bases for this conclusion are summarized in Exhibit SRS-1. This exhibit presents a number of results from FPL's 2013 analyses of the Turkey Point 6 & 7 project including, but not limited to: (i) the number of future fuel cost and environmental cost scenarios in which the project is projected to be cost-effective; (ii) projected fuel savings for FPL's customers; (iii) reduced reliance upon fossil fuels (i.e., fuel diversity); and (iv) projected carbon dioxide (CO_2) reductions. These results, and results of other analyses and calculations, are discussed later in my testimony.

These results, whether examined individually or as a whole, present a strong case for the Turkey Point 6 & 7 project. For example, over the life of Turkey Point 6 & 7, customers are projected to save at least $78 billion (nominal) in fuel costs, based on the Medium Fuel Cost forecast. Additionally, the project will produce energy that otherwise would have required the consumption of substantial amounts of natural gas or millions of barrels of oil annually, and will reduce system CO_2 emissions by millions of tons. In short, completing Turkey Point 6 & 7 continues to be projected as solidly cost-effective and the new nuclear units are projected to be valuable resource additions for FPL's customers.

In regard to the EPU project, this project was completed in April of this year. The increased nuclear capacity that has been delivered by the EPU project is

already benefiting customers and will continue to do so for decades to come. The types of benefits being provided to FPL's customers by the additional nuclear capacity resulting from the EPU project include: (i) over 500 MW of increased firm capacity; (ii) baseload energy delivered from the increased nuclear capacity; (iii) increased fuel diversity for the FPL system due to the additional energy produced by the increase in nuclear capacity; (iv) significant reductions in system fossil fuel usage and system air emissions; (v) an excellent hedge against both increases in fossil fuel costs and environmental regulations and/or costs; and (vi) additional generating capacity located in the Southeastern Florida region (Miami-Dade and Broward Counties) that helps maintain a balance between generation and electrical load in that region.

Q. Would you please briefly explain what you mean by FPL's portfolio approach to resource planning and what part additional nuclear capacity such as Turkey Point 6 & 7 plays in that portfolio approach?

A. Yes. As with all economic analyses, FPL's 2013 economic analyses of the Turkey Point 6 & 7 project provides a "snapshot" of the projected customer benefits associated with Turkey Point 6 & 7 based on current project assumptions, forecasts of numerous costs, and resource planning assumptions. The 2013 feasibility analyses, as with prior feasibility analyses, examine potential future scenarios that result from combining various fossil fuel price forecasts and environmental compliance cost forecasts. Of course, the actual economic performance of FPL's system, including the impacts of future fuel prices, etc., cannot be known until after the fact. That is why FPL examines

the projected impacts of resource additions such as new nuclear capacity over a wide range of potential future scenarios.

The inability to be able to predict with confidence future fuel and environmental compliance costs is a key reason why FPL not only performs these analyses based on multiple forecasts and scenarios, but also why FPL strives for diversity in regard to system resources and fuels in what I will refer to as a portfolio approach to resource planning. Because the price of nuclear fuel is unrelated to fossil fuel prices, and because nuclear power plants produce no emissions such as sulfur dioxide (SO_2), nitrogen oxides (NO_x), or carbon dioxide (CO_2) in the process of generating electricity, additional nuclear capacity is a superb hedge against fossil fuel price volatility and increases in environmental compliance costs. Diversification also improves system reliability.

The Turkey Point 6 & 7 nuclear project will help reduce FPL's reliance on natural gas that is currently delivered into the state of Florida by only two natural gas pipelines. In addition, the Turkey Point 6 & 7 nuclear project will also help further reduce the usage of oil, including foreign oil, by FPL's system. Through diversification generally, and the addition of Turkey Point 6 & 7, FPL is working to keep its electric rates, and thus the resulting bills for its customers, low over the long term while also providing highly reliable electric service.

The current low cost of natural gas is a great thing for FPL's customers because it allows FPL to produce electricity with relatively low fuel costs. This results in lower electric rates for all of FPL's customers as long as natural gas prices remain low. Therefore, FPL has been increasing its use of natural gas to benefit its customers and now supplies approximately 2/3 of all of the electricity it provides to customers by burning natural gas.

However, this increased use of natural gas also represents a growing reliance on natural gas. In turn, this growing reliance on natural gas results in increased risk in regard to potential future changes in natural gas cost and availability.

Consequently, FPL's resource planning takes a balanced portfolio approach to maximize the benefits to customers of using currently low cost natural gas while also taking steps to minimize the risks inherent in having a high reliance on natural gas. Among the steps being taken to minimize this risk are: (i) burning natural gas as efficiently as possible through the addition of multiple high-efficiency combined cycle (CC) generating units, (ii) enhancing the availability of natural gas by pursuing a third natural gas pipeline into Florida (which may also put downward pressure on delivered natural gas prices), (iii) maintaining the ability to continue to burn fuel oil in existing steam generating units by installing electrostatic precipitators at these units, (iv) diversifying

FPL's fuel mix by pursuing additional renewable energy, and (v) significantly diversifying FPL's fuel mix by adding additional nuclear capacity through the recently completed EPU project and the Turkey Point 6 & 7 project.

Additional nuclear capacity is an important aspect of this balanced portfolio approach because it is the only resource option available that can provide baseload, firm capacity at even lower fuel costs than natural gas and which does so using no fossil fuels and producing zero air emissions. In regard to the latter two points - no fossil fuel use and producing zero air emissions - nuclear capacity serves as an excellent hedge against increasing natural gas costs and increasing environmental costs as previously mentioned. These hedge aspects of nuclear capacity are especially valuable attributes in a balanced portfolio approach to serving FPL's customers both today and in the future.

Q. Are you sponsoring any exhibits in this case?

A. Yes. I am sponsoring the following 9 exhibits:

- Exhibit SRS-1: Summary of Results from FPL's 2013 Feasibility Analyses of the Turkey Point 6 & 7 Project (Plus Results from Additional Analyses);
- Exhibit SRS-2: Comparison of Key Assumptions Utilized in the 2012 and 2013 Feasibility Analyses of the Turkey Point 6 & 7 Project: Projected Fuel Costs (Medium Fuel Cost Forecast);

- Exhibit SRS-3: Comparison of Key Assumptions Utilized in the 2012 and 2013 Feasibility Analyses of the Turkey Point 6 & 7 Project: Projected Environmental Compliance Costs (Env II Forecast);
- Exhibit SRS-4: Comparison of Key Assumptions Utilized in the 2012 and 2013 Feasibility Analyses of the Turkey Point 6 & 7 Project: Summer Peak Demand Load Forecast;
- Exhibit SRS-5: Projection of FPL's Resource Needs Through 2025;
- Exhibit SRS-6: Comparison of Key Assumptions Utilized in the 2012 and 2013 Feasibility Analyses of the Turkey Point 6 & 7 Project: Other Assumptions;
- Exhibit SRS-7: The Two Resource Plans Utilized in FPL's 2013 Feasibility Analyses of Turkey Point 6 & 7;
- Exhibit SRS-8: 2013 Feasibility Analyses Results for the Turkey Point 6 & 7 Project: Total Costs, Total Cost Differentials, and Breakeven Costs for All Fuel and Environmental Compliance Cost Scenarios in 2013$ (millions, CPVRR, 2013-2063); and,
- Exhibit SRS-9: EPU Project Benefits to FPL's Customers.

I. 2013 Feasibility Analyses – Analytical Approach

Q. Please provide an overview of the basic analytical approach used for evaluating the Turkey Point 6 & 7 project.

A. The basic analytical approach in the feasibility analyses of Turkey Point 6 & 7 is to compare competing resource plans. FPL utilizes resource plans in its analyses in order to ensure that all relevant impacts to the FPL system are accounted for.

The analysis of each resource plan is a complex undertaking. For each resource plan, annual projections of system fuel costs and emission profiles are developed for various scenarios of fuel cost/environmental compliance costs using a sophisticated production costing model. This model, the P-MArea model, simulates the FPL system and dispatches all of the generating units on an hour-by-hour basis for each year in the analysis. The resulting fuel cost and emission profile information is then combined with projected annual capital costs, plus other fixed and variable costs for each resource plan. In this way, a comprehensive set of projected annual costs, for each year of the analysis, is developed for each resource plan.

One resource plan includes the Turkey Point 6 & 7 units. The other resource plan includes instead an alternate resource option that competes with these two nuclear units. The competing alternate resource option is new highly fuel-efficient CC generating capacity consistent with the CC capacity currently being installed through FPL's modernization projects.

The competing resource plans are then analyzed over a multi-year period. This approach allows FPL's analyses to account for both short-term and long-term economic impacts of the resource options being evaluated. FPL's 2013 feasibility analyses address these economic impacts. In addition, my testimony provides a discussion of three non-economic impacts to the FPL system: system fuel savings, increased system fuel diversity, and system emission reductions, which will result from the Turkey Point 6 & 7 project.

Q. Has the Florida Public Service Commission provided guidance regarding what is required in the feasibility analyses?

A. Yes. The Florida Public Service Commission (FPSC) first provided guidance in its affirmative determination of need order for Turkey Point 6 & 7 (Order No. PSC-08-0237-FOF-EI, page 29), when it stated:

> "FPL shall provide a long-term feasibility analysis as part of its annual cost recovery process which, in this case, shall also include updated fuel costs, 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 us to monitor the feasibility regarding the continued construction of Turkey Point 6 and 7."

In the FPSC's 2009 NCRC order (Order No. PSC-09-0783-FOF-EI, page 14), the FPSC quoted its need determination order and reiterated that these elements are "necessary to satisfy Rule 25-6.0423(5)(c)5, F.A.C."

This guidance from the FPSC clearly distinguishes "sunk costs" from "updated capital cost estimates" in regard to feasibility analyses of nuclear projects. Consequently, FPL has effectively removed sunk costs in its calculation of breakeven costs for the feasibility analyses of Turkey Point 6 & 7. FPL's approach to sunk costs complies with the above mentioned Rule, which directs FPL to evaluate "completing" the project. FPL's approach to sunk costs also follows the guidance provided by the FPSC, and was expressly approved for the Turkey Point 6 & 7 analyses by the FPSC in its 2011 NCRC order (Order No. PSC-11-0547-FOF-EI, pages 17-18 and 38).

Q. Was the analytical approach used in FPL's 2013 feasibility analyses of Turkey Point 6 & 7 similar to the approach used in the Determination of Need filings for this project, and in the feasibility analyses of this project that were presented in previous NCRC filings?

A. Yes. The analytical approach that was used in the 2013 feasibility analyses for the Turkey Point 6 & 7 project is very similar to the approach used in the 2007 Determination of Need filing and in the feasibility analyses presented in the 2008 through 2012 NCRC filings.

Q. Please describe the economic perspective used in the analytical approach for the Turkey Point 6 & 7 project.

A. This perspective is the calculation of breakeven overnight capital costs, in terms of both CPVRR costs and overnight construction costs in $/kW, for the new nuclear units. This same perspective was utilized in the 2007 Determination of Need filing, and in the 2008 through 2012 NCRC filings, for the Turkey Point 6 & 7 project. In later years, as more information becomes available regarding the cost and other aspects of the new nuclear units, another perspective may emerge as more appropriate.

II. 2013 Feasibility Analyses – Updated Assumptions

Q. Do FPL's 2013 feasibility analyses utilize updated assumptions for the specific information referred to in the previously mentioned FPSC Order?

A. Yes. FPL typically seeks to utilize a set of updated assumptions in its resource planning work. By early 2013, FPL updated these assumptions and is using them in its 2013 resource planning work including the nuclear analyses presented in this docket.

Five informational items were listed in Order No. PSC-08-0237 that should be updated and included in FPL's annual long-term feasibility analyses of Turkey Point 6 & 7. These five items are:

1) fuel forecasts;

2) environmental forecasts;

3) breakeven costs;

4) capital cost estimates; and,

5) sunk costs.

FPL's 2013 feasibility analyses for the Turkey Point 6 & 7 project utilized FPL's current assumptions for four of these five items and calculated the current projected value for the fifth item. FPL's 2013 feasibility analyses for the Turkey Point 6 & 7 project included current assumptions for the following four items: items 1), 2), 4), and 5). The remaining item, item 3) breakeven costs, is a result of the analyses (as opposed to an assumption). The results of FPL's 2013 feasibility analyses present breakeven costs for the Turkey Point 6 & 7 project in terms of CPVRR costs and in terms of overnight construction costs in $/kw.

Q. Do FPL's feasibility analyses include FPL's updated assumptions for information other than these 5 items?

A. Yes. FPL also updated a number of other assumptions in early 2013 in preparation for all of its 2013 resource planning work. Consequently, these other updated assumptions are also included in FPL's 2013 feasibility analyses of the Turkey Point 6 & 7 project. A partial listing of these other assumptions include: FPL's load forecast and cost and performance assumptions for new CC capacity.

Q. Please discuss the changes in the forecasted values for fuel costs and environmental compliance costs between the forecasts utilized in the 2013

feasibility analyses and those that were used in the 2012 feasibility analyses.

A. Exhibits SRS-2 and SRS-3 provide these comparisons. Exhibit SRS-2 provides 2012 and 2013 forecasted Medium Fuel Cost values for selected years for natural gas, oil, and nuclear fuel costs. As shown in this exhibit, the 2013 Medium Fuel Cost forecast for natural gas is lower than the 2012 forecast through the year 2035, then higher in subsequent years, consistent with the independent external forecasts and escalation rates relied upon by FPL. A comparison of the forecasted prices for 1% sulfur oil shows that these 2013 forecasted values are lower than in the 2012 forecast through the year 2030, then are also higher in subsequent years. In regard to forecasted nuclear fuel costs, the 2013 forecasted prices are unchanged from the 2012 forecasted prices.

Exhibit SRS-3 presents similar 2012 and 2013 comparative information for forecasted Env II (i.e., mid-level) environmental compliance costs for three types of air emissions: SO_2, NO_x, and CO_2. As shown in the exhibit, there has been no change in projected environmental compliance costs for these three types of air emissions from what was assumed in FPL's 2012 feasibility analyses. The decision not to change these projected compliance costs was made after a discussion in early 2013 with the consultant ICF whose work has been the basis for FPL's environmental compliance cost projections for all of FPL's nuclear analyses from the need filing in 2007 through the present.

ICF's position was that nothing had occurred on either the legislative or regulatory fronts since the 2012 environmental compliance cost projections had been developed that would require a change in these cost projections. As in FPL's 2012 analyses, these projected environmental compliance costs are lower than the projected costs used in FPL's nuclear analyses from 2007 through 2011.

Q. Are any of the fuel cost forecasts or environmental compliance cost forecasts considered the "most likely" forecast?

A. FPL does not consider any fuel cost forecast or environmental cost forecast as the "most likely" cost forecast. FPL's scenario approach is designed to provide a range of possible future fuel and environmental compliance costs.

Q. Please discuss FPL's 2013 load forecast and how it compares to FPL's 2012 load forecast.

A. Exhibit SRS-4 presents the 2012 and 2013 Summer peak load forecasts. As shown in Column (3) of this exhibit, the 2013 forecast of Summer peak load is generally lower than the 2012 forecast.

In addition, Exhibit SRS-4 also provides a projection of the annual and cumulative growth in Summer peak loads associated with the 2013 peak load forecast. As shown in column (5) of this exhibit, FPL projects a cumulative growth in Summer peak load of approximately 4,314 MW by 2022, and 4,992 MW by 2023; i.e., the years in which the two new nuclear units, Turkey Point 6 & 7, are projected to go in-service. Significant growth in peak loads is also

forecast to continue after 2023 as shown by the projected cumulative growth in Summer peak load value for 2025 of 6,364 MW.

Q. Based on this projected growth in Summer peak load, what is FPL's projected need for new resources?

A. FPL's projected need for new resources, assuming that the resource need is met by new generating capacity, is presented in Exhibit SRS-5. This projection assumes that FPL is implementing DSM through the year 2019 at a level consistent with the FPSC's 2011 DSM Plan order (Order No. PSC-11-0346-PAA-EG) and also assumes an additional 100 MW per year of DSM are implemented in the years 2020 through 2025. This exhibit shows that, without the incremental capacity from Turkey Point 6 & 7, and with no new generating resources added after the modernization of Port Everglades in 2016 except for the planned addition of 180 MW of new power purchase capacity in 2021, FPL has a need for new resources starting in 2022 and this need increases every year thereafter. The projected resource need in 2022 is 304 MW of new generating capacity and this projected resource need increases to 2,652 MW by 2025.

Q. What other assumptions changed from the 2012 analyses to the 2013 analyses?

A. Exhibit SRS-6 presents the 2012 and 2013 projections for 10 other assumptions that were utilized in the feasibility analyses of the Turkey Point 6 & 7 project.

Q. Please discuss the first five assumptions.

A. These five assumptions are:

1) the number of environmental compliance cost scenarios;
2) financial/economic assumptions;
3) the projected capital cost of competing CC capacity;
4) the projected heat rate of competing CC capacity; and,
5) the projected cost of firm gas transportation.

In regard to the number of environmental compliance cost scenarios utilized in FPL's 2013 feasibility analyses, FPL is again using three scenarios in its 2013 resource planning work: Env I (representing low CO_2 compliance costs), Env II (representing medium CO_2 compliance costs), and Env III (representing high CO_2 compliance costs).

FPL's financial/economic assumptions used in the 2013 feasibility analyses have changed from those used in the 2012 feasibility analyses due to the outcome of the recent base rate case. The current financial/economic assumptions include the following: return on equity (ROE) is 10.5%; the allowed cost of debt is 4.79%; the debt-to-equity ratio is 40.38%/59.62%.; and the associated discount rate is 7.45%.

The remaining three assumptions involve the costs of the competing new CC capacity used in the feasibility analyses. FPL's current projected (generator only) capital cost of CC capacity is $798/kw in 2018$. The current projected

heat rate of this CC capacity is 6,334 BTU/kwh, and the projected firm gas transportation cost is $1.98/mmBTU in 2018. The projected capital cost and heat rate of the CC unit are lower than projected in 2012. These changes in projected capital cost and heat rate of the CC unit are based on updated estimates for cost and performance of new CC units. There has been no change in the projected firm gas transportation cost.

Q. Please discuss the remaining five assumptions.

A. These five assumptions are:

6) assumed in-service dates for Turkey Point 6 & 7;

7) assumed operating lives of Turkey Point 6 & 7;

8) non-binding capital cost estimate for the new nuclear units;

9) previously spent capital costs that are excluded from the 2013 feasibility analyses; and,

10) the cumulative annual capital expenditure percentages for Turkey Point 6 & 7.

The first of these five assumptions, the projected in-service dates, for planning purposes, of Turkey Point 6 & 7 are unchanged from the 2022 and 2023 in-service dates used in the 2012 feasibility analyses. FPL Witness Scroggs' testimony addresses these dates which represent the earliest practical deployment dates for the new nuclear units.

The second of these assumptions is the assumed operating lives of the two new nuclear units. For purposes of the 2013 feasibility analyses, FPL is again assuming a 40-year operating life for each of the two units. Although this assumption is consistent with the operating life assumption used in prior feasibility analyses, FPL believes this is a conservative assumption.

Two of FPL's four existing nuclear units, Turkey Point 3 & 4, have now been operating for more than 40 years. Furthermore, all four of FPL's nuclear units have received a license extension from the Nuclear Regulatory Commission (NRC) enabling each unit to operate for a total of 60 years. In addition, FPL's parent company, NextEra Energy (NEE), owns and operates two other nuclear units, Point Beach 1 & 2, that have operated for more than 40 years. These two nuclear units, plus a third nuclear unit owned and operated by NEE (Duane Arnold), have also been granted a license extension from the NRC enabling each unit to operate for a total of 60 years. Therefore, FPL believes that its current 40-year operating life assumption for Turkey Point 6 & 7 is a conservative choice.

The third of these assumptions is the non-binding cost estimate for constructing Turkey Point 6 & 7. The range of costs used in the 2013 feasibility analyses is $3,659/kw to $5,320/kw in 2013$. This reflects an updating of the projected cost range. FPL Witness Scroggs' testimony also discusses the updating of this assumption.

The fourth of these assumptions is the previously spent capital costs that are excluded in the 2013 feasibility analysis. In order to account for "sunk" capital costs for the Turkey Point 6 & 7 project, FPL is excluding approximately $192 million of sunk costs that have already been spent through December 31, 2012. This represents an increase of approximately $35 million compared to the approximately $157 million sunk cost value utilized in FPL's 2012 feasibility analyses. FPL Witness Powers discusses the sunk cost value of the Turkey Point 6 & 7 project in her testimony.

The fifth assumption is the cumulative annual capital expenditure percentages for the construction of Turkey Point 6 & 7. The annual expenditure percentage values used in the 2013 feasibility analyses are largely unchanged from the values used in the 2012 feasibility analyses.

Q. It is clear that a number of changes in assumptions were made between those used in the 2012 feasibility analyses and those used in the 2013 feasibility analyses. Were all of these assumption changes favorable to the projected economics of the Turkey Point 6 & 7 project?

A. No. Assumption changes are made on a regular basis by FPL in order to utilize the best and most current information available in its resource planning analyses. Typically, updates to some assumptions are favorable, and changes to other assumptions are unfavorable, for any specific resource option or project.

This was indeed the case for the Turkey Point 6 & 7 project in regard to the changes in assumptions from those used in the 2012 feasibility analyses to those used in the 2013 feasibility analyses. For the Turkey Point 6 & 7 project, some updated assumptions (such as the projected lower capital costs and projected lower heat rates for new CC unit capacity) are unfavorable for the project (although favorable overall for FPL's customers).

All of FPL's updated assumptions, whether favorable or unfavorable for the Turkey Point 6 & 7 project, were included in FPL's 2013 feasibility analyses of the project.

III. The Turkey Point 6 & 7 Project

Q. What resource plans were used to perform the 2013 feasibility analyses of Turkey Point 6 & 7?

A. The two resource plans that were utilized in the 2013 feasibility analyses of Turkey Point 6 & 7 are presented in Exhibit SRS-7. As shown in this exhibit, the two resource plans are identical through 2021. The resource plans differ starting in 2022, with the Resource Plan with Turkey Point 6 & 7 adding the two 1,100 MW nuclear units, one in 2022 and one in 2023. The Resource Plan without Turkey Point 6 & 7 adds two 1,269 MW CC units, one in 2022 and one in 2024. Both resource plans then add the same amount of CC filler

unit capacity through the rest of the analysis periods although the timing of the filler unit additions varies between the two resource plans.

Q. What were the results of the 2013 feasibility analyses for Turkey Point 6 & 7?

A. The results of the 2013 feasibility analyses for Turkey Point 6 & 7 are presented in Exhibit SRS–8. The calculated breakeven nuclear capital costs in overnight construction costs in terms of $/kW in 2013$ are presented in Column (6) of this exhibit. The results in Column (6), when compared to FPL's non-binding estimated range of capital costs in 2013$ of $3,659/kW to $5,320/kW, show that the projected breakeven capital costs for Turkey Point 6 & 7 are above this range in 5 of 7 scenarios of fuel cost and environmental compliance cost. In the remaining 2 scenarios, the projected breakeven capital cost is within the non-binding estimated capital cost range. Thus Turkey Point 6 & 7 is projected to be the economic choice in the majority (5 of 7) of the cases.

It is informative to note that both of the remaining 2 scenarios, in which the projected breakeven costs for Turkey Point 6 & 7 are projected to be within the non-binding cost estimate range, these scenarios are based on the Env I forecast which represents an assumption of relatively low environmental compliance costs continuing every year for the next 50 years. In addition, one of these remaining scenarios is also based on the Low Fuel Cost forecast

which represents an assumption of relatively low natural gas costs continuing every year for the next 50 years.

Also, as evidenced by the CPVRR values for these 2 remaining scenarios, compared to the CPVRR values for all other scenarios, FPL's customers would still benefit greatly if these assumed low costs for natural gas and/or environmental compliance were to materialize. For example, using the projected CPVRR costs for the Resource Plan with Turkey Point 6 & 7, the projected CPVRR costs under the Medium Fuel Cost/Env II scenario are $152,803 million, but are projected to be significantly lower, $125,585 million, under the Low Fuel Cost/Env I scenario. Therefore, although the economics for the Turkey Point 6 & 7 project are diminished under a scenario of lower fuel and environmental compliance costs (i.e., Low Fuel Cost/Env I), FPL's customers are still projected to benefit significantly under such a scenario by more than $27,000 million CPVRR.

Q. In addition to the results of these economic analyses, did FPL's 2013 feasibility analyses identify any additional advantages for FPL's customers that are projected to be derived from the Turkey Point 6 & 7 project?

A. Yes. I will discuss three other advantages to FPL's customers that are projected to result from the Turkey Point 6 & 7 project:

1) system fuel savings;

2) system fuel diversity; and,

3) system CO2 emission reductions.

These advantages for the Turkey Point 6 & 7 project will be discussed by using the results from the 2013 feasibility analyses for the Medium Fuel Cost, Env II scenario.

In regard to system fuel savings, the CPVRR values for the system fuel savings for each scenario of fuel cost and environmental compliance cost is accounted for in the respective total CPVRR savings number for that scenario. As shown in Exhibit SRS-8, these CPVRR savings values are then translated into breakeven costs. Consequently, the system fuel savings have already been accounted for in the breakeven cost values. However, it is informative to also look at the annual nominal fuel savings projections for Turkey Point 6 & 7.

In 2024, the first year in which both of the new nuclear units are in service for a full year, Turkey Point 6 & 7 are projected to save FPL's customers approximately $804 million (nominal) in fuel costs for that year.

Q. What are the projected fuel savings over the operating life of the Turkey Point 6 & 7 units and how does those projections compare with FPL's current total system annual fuel cost?

A. The total fuel savings for FPL's customers is projected to be approximately $78 billion (nominal). FPL's 2012 annual total system fuel cost was

approximately $3.3 billion. Therefore, the projected fuel savings over the life of the Turkey Point 6 & 7 project is equivalent to serving FPL's more than 4.6 million customer accounts (representing approximately 8.9 million people) for approximately 24 years at zero fuel costs for FPL's customers calculated at last year's fuel costs.

Q. Please discuss the projected fuel diversity and CO_2 emission reduction benefits for Turkey Point 6 & 7.

A. Regarding system fuel diversity, in 2024 the relative percentages of the total energy supplied by FPL that is projected to be generated by natural gas and nuclear, without Turkey Point 6 & 7, are approximately 71% and 21%, respectively. With Turkey Point 6 & 7, these projected percentages change to approximately 58% for natural gas and 35% for nuclear. Thus FPL is projected to be far less reliant on natural gas, and more reliant upon nuclear energy, by approximately 14% each.

These percentage changes in system fuel use for a system the size of FPL's are significant. This can be demonstrated by looking at the projected amount of energy that will be supplied by the two new nuclear units in 2024. That value is projected to be approximately 17.7 million MWh. The current forecasted average annual energy use per residential customer in 2024 is 15,043 kWh. Therefore, the projected output from Turkey Point 6 & 7 in 2024 will serve the equivalent of the total annual electrical usage of approximately 1,176,000 residential customers in that year.

The improvement in system fuel diversity from Turkey Point 6 & 7 can also be demonstrated, for illustrative purposes, by looking at the amount of natural gas or oil that would have been needed to produce this same number of approximately 17.7 million MWh in 2024 if that energy had been produced by a conventional steam generating unit with a heat rate of 10,000 BTU/kwh. In such a case, Turkey Point 6 & 7 can be thought of as saving approximately 177,000,000 mmBTU of natural gas (if all of this energy had been produced by natural gas), or approximately 27,600,000 barrels of oil (if all of this energy had been produced by oil), in 2024.

In regard to reduction of system CO_2 emissions, Turkey Point 6 & 7 are projected to result in a cumulative reduction over the expected life of the two units of approximately 265 million tons of CO_2. This will be a significant reduction in CO_2 emissions, representing approximately 629%, of the total CO_2 emissions from all FPL-owned generating units in 2012 (which was approximately 42 million tons). Stated another way, this projected cumulative CO_2 emission reduction from Turkey Point 6 & 7 is the equivalent of operating FPL's very large system of more than 24,000 MW of generation for approximately 75 months, or approximately 6.3 years, with zero CO_2 emissions.

Q. In regard to the projected fuel cost savings and emission reductions discussed above, does the fact that Turkey Point 6 & 7 will produce

electricity using no fossil fuel and with zero air emissions also represent important hedge benefits for FPL's customers?

A. Yes. Nuclear power provides an important hedge for customers against the potential for future natural gas prices to be higher than forecasted and the potential for costly environmental (especially CO_2) regulations. Because the price of nuclear fuel is unrelated to fossil fuel prices, and because it produces no SO_2, NO_x, CO_2, etc., emissions in producing electricity, it is a superb hedge against higher fossil fuel costs and environmental compliance costs.

Q. Does Turkey Point 6 & 7 provide other hedge benefits?

A. Yes. There are potential avoided cost benefits; i.e., hedge benefits, that will be provided by Turkey Point 6 & 7 (and which have already been provided by the completed EPU project) if a "nuclear neutral" Renewable Portfolio Standard (RPS) or Clean Energy Standard (CES) mandate is imposed in the future. In such a circumstance the 2,200 MW of Turkey Point's nuclear capacity will reduce the need for, and the cost of, a large amount of renewable generation that would otherwise need to be built to meet the mandate. Such cost savings would likely be significant. This mandate has the possibility to occur in the future with or without the establishment of CO_2 compliance costs.

Q. Will Turkey Point 6 & 7 also defer/avoid costs of new transmission facilities that would otherwise be needed to import power into the Southeastern Florida region?

A. Yes. The addition of 2,200 MW of capacity from Turkey Point 6 & 7 in Miami-Dade County is projected to achieve significant transmission cost

savings by avoiding the construction of transmission facilities that would otherwise need to be built to import power from outside the Southeastern Florida region (Miami-Dade and Broward Counties) into that region. These savings are currently projected to be approximately $933 million CPVRR. This savings value is accounted for in FPL's 2013 feasibility analyses of the Turkey Point 6 & 7 project.

Q. What conclusions do you draw from the results of the 2013 feasibility analyses of Turkey Point 6 & 7?

A. In regard to these economic feasibility analyses, the Turkey Point 6 & 7 project is clearly projected to be the economic choice in the majority (5 of 7) of scenarios examined. In the remaining scenarios (which are based on assumptions of either relatively low environmental compliance costs, or relatively low environmental compliance and natural gas costs, each year for the next 50 years), the projected breakeven capital costs are within the non-binding estimated capital cost range for the new nuclear units. Therefore, Turkey Point 6 & 7 is projected to be the economic choice in the majority of cases; i.e., in 5 of 7 scenarios, and will be beneficial in terms of increased fuel diversity, reduced emissions, and avoided regional transmission expenditures in all scenarios.

Thus, the results of the 2013 feasibility analyses show that Turkey Point 6 & 7 continues to be projected as a solidly cost-effective capacity and energy choice for FPL and its customers. In addition, the results of FPL's 2013

feasibility analyses show that FPL's customers are projected to significantly benefit from Turkey Point 6 & 7 in regard to system fuel savings, system fuel diversity, system CO_2 emission reductions, and avoided regional transmission expenditures once the Turkey Point 6 & 7 units go in-service. These conclusions fully support the feasibility of continuing the Turkey Point 6 & 7 project.

IV. The EPU Project

Q. What is the status of the EPU project, particularly in regard to the project's objective?

A. The EPU project is essentially complete. The objective of the EPU project, as approved in its Need Determination, was to provide approximately 400 MW of additional nuclear generation from FPL's existing nuclear units. That objective has not only been met, it is being surpassed with more than 500 MW of additional nuclear generation being delivered. Therefore, no feasibility analysis to examine "completion" of the EPU project is necessary or appropriate. However, I will briefly discuss various benefits to FPL's customers that are currently being delivered, and which will continue to be delivered for decades to come, from the recently completed EPU project.

Q. What types of benefits to FPL's customers are being delivered by the EPU project?

A. There are numerous types of benefits that the EPU project is delivering to FPL's customers. These benefits include:

1) More than 500 MW of increased nuclear capacity. (Although the exact magnitude of increased nuclear capacity delivered by the recently completed EPU project will not be known until the testing at all of the nuclear units is completed, a nominal value of 512 MW of increased capacity from the EPU project is assumed for discussion purposes in the remainder of my testimony.) This value of 512 MW is 113 MW, or approximately 28%, more incremental capacity than the 399 MW of increased capacity that was assumed in early projections for the EPU project.
2) These 512 MW are increases in firm capacity which helps meet FPL's needs for future resources, thus avoiding and/or deferring future capacity additions.
3) The 512 MW of increased capacity is baseload capacity that operates at very high (approximately 90% or higher) annual capacity factors, thus delivering very large amounts of energy each year.
4) This baseload energy is very low cost energy due to the very low fuel costs of nuclear fuel. This not only results in significantly lowering total system fuel costs for FPL's customers, it also

serves as a valuable hedge against future increases in fossil fuel costs that would increase FPL's electric rates.

5) This baseload energy is also produced with zero emissions. This not only results in significantly lowering FPL's total system emissions, it also serves as a valuable hedge against future increases in environmental compliance costs that would increase FPL's electric rates.

6) The additional energy produced from the incremental 512 MW of nuclear capacity significantly increases fuel diversity for the FPL system by increasing the use of nuclear fuel and decreasing the use of fossil fuels, particularly natural gas.

7) The portion of the increased 512 MW of additional generating capacity that is located at the Turkey Point site (i.e., from the increased capacity added at existing nuclear units Turkey Point 3 & 4) helps maintain a balance between growing electrical load in the Southeastern Florida region (Miami-Dade and Broward Counties) and generation located in that region.

8) As previously discussed in regard to the Turkey Point 6 & 7 project, the increased nuclear capacity that has been delivered by the completed EPU project also serves as a valuable hedge against higher costs for FPL's customers that would occur with a potential RPS or CES mandate.

Q. Would you please provide a current estimate of approximate annual fuel cost savings in the first full year of operation of the uprated units?

A. Yes. In the 2012 feasibility analyses for the EPU project, the projected fuel cost savings for the first full year of operation (i.e., the year 2014) was $114 million (nominal) based on a Medium Fuel Cost forecast. A current estimate of this first full year fuel cost savings can be derived by making two adjustments to the $114 million savings value: one for changes in forecasted fuel prices for the year 2014 and one for changes in incremental capacity (from 490 MW to 512 MW) delivered by the EPU project.

After making these two adjustments (reflecting lower forecasted fuel prices and greater EPU output), the updated estimate is approximately $102 million (nominal) in fuel savings for the year 2014. The end result is a slightly lower, but still significant, projected fuel savings for FPL's customers in 2014. This annual fuel savings value for 2014 is projected to increase every year thereafter as forecasted fossil fuel prices increase.

The current estimate of $102 million (nominal) in fuel savings in the year 2014 is presented in Exhibit SRS-9.

Q. Please provide current estimates for other benefits the EPU project is already providing, and will continue to provide, to FPL's customers.

A. Current estimates for some of the other benefits to FPL's customers delivered by the EPU project are also presented in Exhibit SRS-9. These current

estimates are derived by using similar adjustments for incremental capacity, etc., to the results from the 2012 feasibility analyses. The current estimates are summarized below:

- $3.4 billion (nominal) in total fuel savings over the life of the uprated nuclear units. (FPL's 2012 total fuel cost was approximately $3.3 billion. Therefore, the projected fuel savings from the EPU project over the lives of the uprated nuclear units equates to more than one full year of zero fuel costs for FPL's customers compared to FPL's 2012 total system fuel costs.);
- The increased nuclear capacity delivered by the EPU project is projected to reduce FPL's reliance on natural gas by approximately 3% in 2014;
- The amount of energy that will be produced by the incremental nuclear capacity in the first full year of operation of the uprated nuclear units (2014) is equivalent to the annual electricity usage of approximately 326,000 residential customers in 2014. This represents a projected increase in projected benefits from the EPU project compared to the 2012 feasibility analyses results due to the increase in incremental capacity from 490 MW to 512 MW; and,
- Over the lives of the uprated nuclear units, the incremental nuclear capacity is projected to save the equivalent of 42,844,000 mmBTU of natural gas or 6,687,000 barrels of oil; and to reduce more than 33

million tons of CO_2 emissions. (In regard to the projected cumulative CO_2 emission reduction value, this is the equivalent of operating FPL's very large system of more than 24,000 MW of generation for approximately 10 months with zero CO_2 emissions).

These savings values for fossil fuel and CO_2 emissions represent projected increases in projected benefits from the EPU project compared to the 2012 feasibility analyses results due to the increase in incremental capacity from 490 MW to 512 MW. In addition, these projected increased benefits regarding reductions in fossil fuel use, and in CO_2 emissions, also represent increased hedge benefits for FPL's customers against future increases in fossil fuel costs and increasing environmental compliance costs.

In summary, the current estimates of benefits from the completed EPU project presented in Exhibit SRS-9 show that the incremental nuclear capacity delivered by the EPU project is already providing, and will continue to provide for decades, significant benefits for FPL's customers which, in some cases, are even greater than the benefits projected in FPL's 2012 feasibility analyses.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

REBUTTAL TESTIMONY OF DR. STEVEN R. SIM

DOCKET NO. 130009 - EI

July 5, 2013

Q. Please state your name and business address.

A. My name is Steven R. Sim and my business address is Florida Power & Light Company, 9250 West Flagler Street, Miami, Florida 33174.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

Q. Are you sponsoring any rebuttal exhibits in this case?

A. Yes. I am sponsoring the following exhibit that is attached to my rebuttal testimony:

Exhibit SRS – 10: An Example of How Present Value Results From Projects With Different In-Service Dates Are Not Transferable

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to explain why a number of statements made by Office of Public Counsel (OPC) Witness Dr. Jacobs regarding the recently completed Extended Power Uprate (EPU) project are incorrect, and why a recommendation he makes is based on a fundamentally flawed attempt at analysis. Therefore, Dr. Jacobs' testimony is not reliable

and should not be given serious consideration by the Florida Public Service Commission (FPSC).

Q. How is your rebuttal testimony organized?

A. My rebuttal testimony is organized into three sections. Section I takes a look back at the completed EPU project and briefly discusses how it was proposed and approved, the results of the feasibility analyses of the project from 2007 on, and the fact that Dr. Jacobs has not disputed the consistent results of those analyses which project that FPL's customers will benefit from completing the overall EPU project. Section II takes a critical look at Dr. Jacobs' recommendation to impose a penalty on FPL. Section III then addresses a number of problematic statements made by Dr. Jacobs in his testimony that are not discussed in the prior two sections.

Q. Please summarize your rebuttal testimony.

A. The EPU project has now been completed and the additional 522 MW of nuclear capacity it has delivered is already benefiting FPL's customers. This additional nuclear capacity will continue to benefit FPL's customers for decades to come. In regard to the amount of additional nuclear capacity, the EPU project impressively overachieved by delivering approximately 120 MW, or approximately 30%, more capacity than was projected early in the project.

The EPU project was proposed to the FPSC as a single integrated project consisting of four nuclear units and two sites. The FPSC approved the project

on that basis. From the EPU need filing in 2007 through 2012, the last year before completion of the project, FPL's annual feasibility analyses have evaluated the EPU project as a single integrated project. The FPSC has relied upon these analyses of the EPU as a single integrated project in making their annual decisions regarding the feasibility of completing the project.

Each of these annual feasibility analyses of the EPU project showed that its completion was projected to be cost-effective in either 6 of 7, or in 7 of 7, scenarios of fuel cost forecasts and environmental compliance cost forecasts. Over this time period, the OPC, through Dr. Jacobs' testimonies, has not disputed the findings from any of the annual feasibility analyses, all of which indicated that the overall EPU project, as proposed by FPL and approved by the FPSC, was projected to be cost-effective for FPL's customers. Even now, in his 2013 testimony, Dr. Jacobs takes no issue regarding the cost-effectiveness of what the completed, integrated EPU project has delivered.

But now in 2013, in hindsight after the EPU project has been completed, OPC's witness Dr. Jacobs recommends that the FPSC impose a $200 million penalty on FPL. He bases such a penalty on his belief that a subset of the completed EPU, the portion of the EPU at the Turkey Point site, is *"clearly uneconomic"*. By making such an absolute statement, Dr. Jacobs is indirectly claiming that there are no possible future fuel costs, environmental compliance costs, operating lives of the nuclear units, regulations, legislation,

etc. by which the Turkey Point subset of the EPU project could possibly prove to be cost-effective. Dr. Jacobs' belief in his ability to predict future costs and circumstances with absolute accuracy decades into the future is, of course, nonsensical. Dr. Jacobs made a similar absolute statement of *"uneconomic"* last year in this testimony.

In his 2013 testimony, Dr. Jacobs attempts a new 'analysis' by which he hopes to justify his claim that this subset of the EPU can never be cost-effective. However, the key assumption in his attempt this year is that projected benefits from a different nuclear project (Turkey Point 6 & 7), that are presented in terms of breakeven costs for that specific project, are automatically applicable and transferable as breakeven costs for his selected subset of the recently completed EPU project. This is a fundamentally flawed assumption. The new nuclear project, and Dr. Jacobs' selected subset of the EPU project, share the title "nuclear", but that is about all they share. They have in-service dates that are 10 years apart, are of different capacity sizes, etc. In short, these are unrelated and separate projects. Consequently, results from the analysis of one project will not be applicable or automatically transferable to the other project.

This critical look at Dr. Jacobs' implied gift of prophecy regarding future fuel costs, environmental costs, legislation, etc., coupled with his fundamentally flawed assumption of 'one cost value fits all' in regard to nuclear projects that

he attempted to build his analysis around, result in completely discrediting his claim that the Turkey Point subset of the EPU project cannot, under any future circumstances, be cost-effective. Consequently, Dr. Jacobs' rationale for recommending a penalty for FPL has collapsed.

Dr. Jacobs' testimony also includes a number of statements that are incorrect and/or misleading. One of these is his attempt to portray FPL's exclusion of sunk costs in the feasibility analyses as something FPL concocted for the nuclear analyses. The reality is that excluding sunk costs is standard practice in economic analyses. The FPSC recognized this in providing direction that the costs to be used in the feasibility analyses are the costs to complete the project; i.e., costs that are separate from sunk costs. Furthermore, a co-panelist of Dr. Jacobs in a recent Georgia Power nuclear docket, and an author whose article on sunk costs Dr. Jacobs uses as a reference source in his 2013 testimony, both agree with FPL and the FPSC that sunk costs are properly excluded in economic analyses.

Dr. Jacobs' testimonies in 2012 and again in 2013 also tend to blur the distinctions between, and the meanings of, the commonly used terms 'overnight costs' and 'installed costs'. This has led to some confusing and/or misleading statements in his testimonies.

Dr. Jacobs also discusses the fact that at the time of the 2012 NCRC hearing, FPL had a more recent projection of EPU costs. He states that if this projection, that was not used in FPL's 2012 feasibility analyses, had been discussed at the 2012 hearing, then the FPSC *"may have"* reached a different decision in 2012. His selected projection showed that a large amount of expenditures had been made by the time of the 2012 hearing. However, what Dr. Jacobs fails to recognize is that FPL's 2012 feasibility analyses were based on a projection of expenditures from January 1, 2012 through December 31, 2012 as costs to complete the EPU project. If the 2012 feasibility analyses had been updated at the time of the 2012 hearing to recognize the expenditures that had already been spent in 2012 up to that point, then these expenditures would fall into the category of sunk costs and would have properly been excluded from the analyses. Consequently, the completion of EPU would have been projected to be even more cost-effective for FPL's customers in any updated analysis than it was in the "original" 2012 feasibility analyses.

Based on this summary of the many problems throughout Dr. Jacobs' testimony, I conclude that Dr. Jacobs' recommendation that a significant financial penalty be imposed upon FPL, and numerous other statements presented in his testimony, should be rejected by the FPSC in this docket.

Section I: A Look Back at the Completed EPU Project

Q. From a resource planner's perspective, how do you view the completed EPU project?

A. The EPU project is delivering approximately 522 MW of additional nuclear capacity that is currently benefiting FPL's customers and which will continue to benefit FPL's customers for at least several more decades. These incremental 522 MW for FPL's customers include approximately 120 MW, or approximately 30%, more capacity than what was projected in the early years of the project. (Note that the 522 MW value is also 10 MW more than was projected in FPL's May 2013 direct testimony. These additional 10 MW all come from the Turkey Point site.)

This incremental capacity of 522 MW already being delivered by the project has the following characteristics:

- firm capacity;
- baseload capacity with capacity factors of 90% or higher;
- produces energy with zero emissions of sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon dioxide (CO_2);
- produces energy using no fossil fuel, thus significantly contributing to fuel diversity for the FPL system;
- produces energy at very low costs due to the very low costs of nuclear fuel;

- the portion of the 522 MW of incremental capacity that is located at the Turkey Point site helps maintain a balance between growing electrical load in the Southeastern Florida region (Miami-Dade and Broward Counties) and generation located in that region; and,
- provides a valuable hedge against future increases in fossil fuel costs and increasing environmental compliance costs.

This combination of characteristics can only be provided by additional nuclear capacity and these characteristics are valuable to FPL's customers who are already benefiting from the project.

Q. Was the EPU project proposed to the FPSC in the 2007 Need filing as a single integrated project encompassing four nuclear units and two sites?

A. Yes.

Q. Did the FPSC approve the project as a single integrated project?

A. Yes.

Q. In all of the feasibility analyses of the EPU project that were presented to the FPSC since the 2007 Need filing, was the project always evaluated as a single integrated project?

A. Yes.

Q. Did the FPSC utilize these annual feasibility analyses of a single integrated EPU project as the basis for their annual decisions regarding EPU?

A. Yes.

Q. What were the results in all of these feasibility analyses presented to the FPSC annually since 2007 for the EPU project?

A. Completing the integrated EPU project was projected to be cost-effective for FPL's customers in each annual feasibility analysis in either 6 of 7, or in 7 of 7, scenarios of fuel cost forecasts and environmental compliance cost forecasts. (In those annual analyses in which completion of EPU was projected to be not cost-effective in a single scenario, that scenario always assumed low fuel costs and low environmental compliance costs would occur every year for several decades.)

Q. In his testimony, does Dr. Jacobs dispute the results of any of the annual EPU feasibility analyses since 2007 that consistently projected that completing the full integrated EPU project was cost-effective?

A. No.

Section II: A Critical Look at Dr. Jacobs' Recommendation

Q. Dr. Jacobs recommends that FPL be penalized by not being able to recover $200 million in EPU project expenditures. What do you understand the basis is for his recommendation?

A. The economic basis for his recommendation of a penalty is Dr. Jacobs' contention that the Turkey Point subset of the EPU project cannot be cost-effective. His testimony states this in the following passage: *"...the extremely expensive cost of the Turkey Point EPU capacity will be uneconomic to*

ratepayers. Therefore, I recommend that the Commission act to disallow some of these excessive and unreasonable costs." (page 13, lines 1-3, from his direct testimony). However, I note that in his testimony, Dr. Jacobs does not explain which specific costs are 'excessive' or 'unreasonable', nor does he claim that any specific costs were imprudently incurred.

Q. How would you summarize the issue posed by Dr. Jacobs' testimony?

A. Dr. Jacobs is looking back at a project that: (i) has already been completed; (ii) is delivering approximately 30% more capacity than was originally estimated; (iii) is already benefiting FPL's customers; and (iv) whose overall project cost-effectiveness he has not challenged, but he nonetheless wants FPL penalized $200 million because he believes a subset of the project may not be cost-effective.

Q. What does Dr. Jacobs' testimony state regarding the economics of the Turkey Point subset of the overall EPU project?

A. In addition to the statement provided above, Dr. Jacobs' perception of the economics of this subset of the overall EPU project is perhaps best summed up by the following two statements:

- *"The Turkey Point EPU...is clearly uneconomic for FPL's customers."* (page 18, line 11); and,
- *"...on a stand-alone basis the Turkey Point EPU project is clearly uneconomic and harmful to FPL customers."* (page 27, lines 7 and 8)

Based on these statements, Dr. Jacobs is essentially claiming that he knows with certainty that this subset of the overall EPU project cannot, under any possible future circumstances, be cost-effective. He makes this claim even though it is obvious that the actual benefits realized by the EPU will not be known for decades.

Q. What is your reaction to such a claim?

A. Frankly, I am amazed that anyone who has been involved, even on the periphery, of the electric utility industry as long as Dr. Jacobs' résumé indicates he has been involved, would be willing to indicate, even indirectly, that he/she knows with absolute certainty what future fuel costs, environmental costs, operating lives of nuclear units, regulation, legislation, etc. will be over the next several decades. Yet one would have to be making just that claim if one is stating (repeatedly) that a subset of a project is *"clearly uneconomic"* when the future outcomes of all of the items listed above will determine the actual benefits that the EPU project will provide to FPL's customers.

Even a quick review of the fuel cost and environmental compliance cost forecasts used in the annual feasibility analyses presented to the FPSC from 2007 to the present would show changes, with some of the changes being significant changes, in these forecasts from year-to-year. In addition, the FPSC expects forecasts of these costs to continually change and thus instructed the utilities to update these forecasts each year in their feasibility

analyses. Furthermore, FPL's annual feasibility analyses recognize that there is great uncertainty in these future costs and addresses that uncertainty by using multiple scenarios of fuel cost forecasts and environmental compliance costs forecasts in its feasibility analyses. Thus uncertainty regarding future fuel costs, future environmental compliance costs, etc. is recognized by the FPSC and FPL.

However, Dr. Jacobs must believe that he knows what these future costs will be with such certainty that it is clear to him (and likely only to him) exactly what the benefits of a subset of the overall EPU project will be over these decades. Such a belief is obviously nonsensical.

Q. Despite Dr. Jacobs' belief that he can predict the future with certainty, has FPL examined what certain changes in some of these key forecasts or assumptions would mean in regard to additional benefits for the EPU project?

A. Yes. Dr. Jacobs made similar absolute 'can't be economic' claims in his testimony last year (thus clearly indicating this year that he has an ongoing belief in his psychic abilities – despite the fact that the 2012 fuel cost forecast that was the basis for the 2012 projection of EPU fuel cost benefits has changed in 2013). FPL pointed out last year in rebuttal testimony that no one can possibly predict future fuel costs, environmental compliance costs, operating licenses of nuclear units, regulation, legislation, etc. over the next

several decades accurately enough to make such definitive statements as Dr. Jacobs is making.

In order to demonstrate how much the projected benefits for the EPU project could change, my 2012 rebuttal testimony made the following points regarding how the projected benefits for EPU could quickly and dramatically change:

- changing the 2012 fuel cost forecast to the fuel cost forecast used in feasibility analyses just two years earlier increased the EPU's projected fuel savings by $430 million CPVRR;
- changing the 2012 environmental compliance cost forecast to a forecast used in feasibility analyses just one year earlier increased the EPU's projected environmental compliance cost savings by $250 million CPVRR;
- if the operating licenses for the four nuclear units were extended for 20 more years, the increase in just the projected fuel cost and environmental compliance cost savings alone for EPU, compared to that presented in the 2012 feasibility analyses, would be $1,200 million CPVRR; and,
- if a Clean Energy Standard is imposed which has a 'nuclear neutral' provision, the net savings in renewable energy costs that would

otherwise be incurred without the incremental EPU capacity were projected to be $192 million CPVRR.

Therefore, what is truly clear is that not only do forecasts of fuel costs, environmental costs, etc. continually change, but that these changes can have significant impacts on the projected benefits of the EPU project. And, because the most recent forecasted values for fuel costs and environmental compliance costs are at the low end of costs forecasted since the NCRC dockets began, I believe that any significant changes in these costs which occur in the future are likely to be in the direction of higher costs; i.e., towards higher benefits for EPU.

Q. Did Dr. Jacobs perform any rigorous feasibility analysis of his own to demonstrate his claim that the Turkey Point subset of the EPU project could never be economic and present the results of that analysis in his testimony?

A. No.

Q. What did he attempt to do to support his claim?

A. I believe the following four statements provide a good summary of what Dr. Jacobs is attempting to use as a justification for his claim that the Turkey Point subset of the completed EPU can never be economic under any future circumstance:

- *"This is what he calls the nuclear 'breakeven cost'."* (page 15, line 5)

- *"If, as Dr. Sim contends, his breakeven calculation quantifies the maximum installed cost of new nuclear capacity that is cost-effective, then it follows that Turkey Point uprate capacity must cost less than the breakeven value to be cost-effective."* (page 13, lines 22 and 23, and page 14, lines 1 and 2)
- *"The cost of the EPU capacity, which was completed in early 2013, is expressed in current 2013 dollars. Dr. Sim's "breakeven costs" are also expressed in 2013 dollars, so the numbers are "apples to apples."* (page 16, lines 19-21)
- *"The St. Lucie EPU project, at $3,800/kW is well below all the breakeven cost scenarios and thus, using Dr. Sim's logic, is economic."* (page 17, lines 9-11)

From these statements, it is clear that what Dr. Jacobs is attempting to do is to take the benefits calculation results from one project, let's call it Project A (i.e., Turkey Point 6 & 7), and apply those results to Project B (the Turkey Point subset of EPU).

Q. Does this approach make sense?

A. No. Let's examine the first of his statements quoted above: *"This is what he calls the nuclear 'breakeven cost'."* (The "he" in this statement is me.) Dr. Jacobs is referring to a projected breakeven cost calculated specifically for the Turkey Point 6 & 7 project. That breakeven cost is consistently labeled and referred to in my direct testimony as a value calculated for the Turkey Point

6 & 7 project. It is never portrayed as a universally applicable value for all nuclear projects.

However, Dr. Jacobs appears to assume that because both projects have the word "nuclear" in their title, then the numeric results of a calculation for one nuclear project are automatically applicable and transferable to any other nuclear project. He uses the highest projected breakeven cost value ($6,640/kw) in 2013$ for Project A (Turkey Point 6 & 7) and claims that if the cost for Project B (a subset of the already completed EPU) exceeds that value, then Project B cannot be economic. (Contrary to Dr. Jacobs' characterization of this approach as *"...using Dr. Sim's logic..."*, this illogical approach is entirely Dr. Jacobs' creation. And as far as the 'logic' part of his description goes, the best description of his approach is 'tortured' logic.)

His lack of understanding of how resource planning analyses should actually be performed to provide meaningful results is perhaps understandable. In his testimony, Dr. Jacobs describes his activities since 1986 on page 3, lines 3-5, as participating in *"...rate case and litigation support activities related to power plant construction, operation and decommissioning."* Noticeably absent from his description of his work experience is anything remotely associated with electric utility resource planning. If he really does not have a significant amount of resource planning knowledge and experience, then it is

understandable why his attempt at applying this 'analysis' approach is so misguided.

Economic analyses of different projects or resource options simply don't have automatically applicable or transferable results in the manner Dr. Jacobs believes they do. In previous NCRC dockets, FPL has explained that a comparison of resource options on a $/kwh basis, or on a $/kw basis (as Dr. Jacobs attempts to do), is meaningless in regard to making a final decision about resource options unless the resource options in question are identical, or nearly identical, in each of a number of characteristics.

The two resource options in question, Turkey Point 6 & 7 and a subset of EPU, are not even close to being identical in regard to several of these key characteristics including in-service dates and capacity (MW). Differences in these key characteristics mean that the impacts the two resource options will have on the FPL system will be significantly different. Therefore, the economics of these two resource options cannot be meaningfully evaluated based on a $/kw comparison and the results from an economic analysis of one resource option are not applicable or automatically transferable to the other resource option.

For example, consider the fact that the in-service date of Project A is a decade later than the already in-service Project B. This means that Project B's

impacts for the first 10 years will be on an FPL system (i.e., the fleet of generating units, power purchases, DSM, etc.) that is markedly different than the FPL system that Project A will impact when it begins service 10 years later. In addition, the 10-year difference in in-service dates means that the discounting of benefits will have different impacts on determining breakeven costs for Project A and Project B.

Consequently, his misguided assumption that the $6,640/kw breakeven cost in 2013$ for Turkey Point 6 & 7 with an in-service date of 2022/2023 is applicable and automatically transferable to EPU which is already in-service is fundamentally flawed.

Q. Would you please provide a simple example showing that the numeric results from economic analyses of two resource options or projects that are dissimilar in even one of the key characteristics are not automatically transferable?

A. Yes. The simple example is provided in Exhibit SRS – 10. In order to keep the example as simple as possible, the example looks at only one hypothetical project with two different in-service years: 2013 and 2022. For simplicity's sake, we will also assume that the project cost and project benefits all occur in a single year (the in-service year). We further assume that the cost of the project will be incurred in one day so that there is no difference between overnight costs and installed costs. We use the same discount rate of 7.45%

that was used in FPL's 2013 feasibility analyses. Two different scenarios are examined.

In both scenarios, we start by looking at the project with a 2013 in-service date. If we assume that the total benefits of the project are, for example, $1,000,000 in nominal dollars (which are also $1,000,000 in net present value 2013$ because the benefits occur in 2013), then the breakeven cost for the 2013 project is $1,000,000 both in terms of nominal and NPV dollars. This is shown in Column (3) in the exhibit in both the upper and lower halves of the page.

Now let's move the same project out in time so that it has a 2022 in-service date. In Scenario 1, presented in the top half of the exhibit, we assume that the nominal savings remain at $1,000,000 in the year 2022 as shown in Column (5). Therefore, the nominal breakeven cost will remain at $1,000,000. However, after discounting this nominal value back to 2013, the 2013$ present value breakeven cost becomes $523,772 as shown in Column (6), not the $1,000,000 value of the 2013 in-service project. Clearly the present value 2013$ breakeven costs of the two projects are neither identical nor transferable.

In Scenario 2, presented on the bottom half of the exhibit, we assume that the avoided costs (i.e., the benefits) escalate over the 10 year period from 2013 to

2022 by an escalation rate of 2.5% per year. Now the nominal benefits increase from $1,000,000 to $1,248,863 as shown in Column (8). Similarly, the present value 2013$ benefits increase to $654,119 as shown in Column (9). In this scenario the 2013$ benefits value again represents the 2013$ breakeven cost. However, this 2013$ present value breakeven cost of $654,119 is still not the same as the $1,000,000 breakeven cost value in 2013$ for the 2013 in-service project. Therefore, again in this scenario the breakeven costs are neither identical nor transferable.

This simple example demonstrates that Dr. Jacobs' attempt at selecting a breakeven cost value for one project, then using it as a standard by which to judge the economics of another project that is dissimilar in regard to even one key characteristic (in-service date), is fundamentally flawed (even if the two resource options have the word "nuclear" in their titles).

Section III: Other Problematic Statements

Q. Were there problems in other statements or claims made in Dr. Jacobs' testimony that have not yet been addressed?

A. Yes. Dr. Jacobs' testimony contains a number of problematic statements that address three topics: (i) the exclusion of sunk costs in economic analyses, (ii) the difference between installed and overnight costs, and (iii) whether the

FPSC would have made a different decision last year if a different EPU cost projection had been discussed at the hearing.

Q. What statements do you wish to discuss from Dr. Jacobs' testimony regarding the exclusion of sunk costs in economic analyses?

A. These statements include:

- *"I challenged FPL's methodology for gauging the economic feasibility of its uprates, which involved excluding past expenditures from the study."* (emphasis added) (page 8, lines 4-6);
- *"...considering the future construction and related costs alone (in other words, consistent with FPL's preferred feasibility methodology)..."* (emphasis added) (page 11, line 23 to page 12, line 2); and,
- *"...based even on Dr. Sim's flawed insistence on ignoring sunk costs."*(emphasis added) (page 26, lines 22 and 23).

Dr. Jacobs is clearly trying to portray the exclusion of sunk costs in economic analyses as something that FPL or I dreamed up for use in the EPU analyses. Nothing could be further from the truth.

Q. Please elaborate.

A. The practice of excluding costs that have already been spent (i.e., sunk costs) in economic analyses is standard practice because such costs are obviously immaterial in regard to a decision regarding whether to proceed with a project. Three points should help demonstrate the fact that excluding sunk costs is standard practice and not an FPL contrivance.

First is the fact that the FPSC provided early direction in regard to how to account for costs in feasibility analyses of nuclear projects. Their direction was that the costs to include in the analyses are the costs to complete the project. The costs to complete are clearly separate from costs that have already been spent. Thus the FPSC has recognized that the costs to complete the project, not costs already spent, are the appropriate costs to include in feasibility analyses and they directed the utilities to act accordingly in their analyses.

Second is the fact that in a recent (2009) nuclear docket in Georgia, a panel consisting of Dr. Jacobs and Mr. Hayet was asked a question regarding the fact that Georgia Power excludes sunk costs in their economic analyses. Mr. Hayet provided the panel's response:

> *"The point there is just to point out that the economic analysis as you go forward with the project, the question that you have to answer is what are the future costs that will be incurred and what do those costs – how do those costs compare to your next best alternative. So, the notion of the costs that have already been spent as being sunk is something that you do ignore and we're just simply pointing that out, that's the company's practice, we agree with it and that's fairly industry standard."* (page 202,

lines 23-25 and page 203, lines 1-7; Georgia Public Service Commission Docket No. 29849)

Third is the article on sunk costs by Mr. Charles Conway that Dr. Jacobs included as Exhibit WRJ - 7 to his direct testimony. On page 1 of 5, third paragraph of this exhibit/article, Mr. Conway states:

"Sunk costs are money that you've already spent on one of the options, before making the decision. Regardless of which option you choose, the money has already been spent. That money is, for all intents and purposes, gone. If you choose option A, the money is spent. If you choose option B, the money is spent. If you choose to do nothing, the money has still been spent. The result is that sunk costs should not be considered in your decisions. Sunk costs do not alter the future costs and revenues of your options, so they should not be included in the analysis."

Thus other parties, including the FPSC, a co-panelist of Dr. Jacobs in another nuclear docket, and an author selected by Dr. Jacobs to serve as a reference source for his testimony this year, all agree with FPL that excluding sunk costs from economic analyses is the correct approach, even if Dr. Jacobs does not.

Q. Are there also problematic statements in Dr. Jacobs' testimony regarding certain terminology such as overnight costs and installed costs?

A. Yes. I believe there were problems relating to these terms in his 2012 testimony. FPL pointed these problems out in its 2012 rebuttal testimony. Unfortunately, Dr. Jacobs attempts to defend his 2012 choice of types of costs to use for a comparison in his 2013 testimony and this may have created confusion for readers of his 2013 testimony.

Q. An attempt to clear up this confusion regarding terminology would be helpful. Please start with providing simple definitions, and then discuss what the 2012 testimonies presented.

A. Both of these terms refer to the cost of construction, but the terms refer to different types of costs. In simple terms, "overnight cost" (or "overnight construction cost") refers to the cost if one could literally build a project overnight. Therefore, no escalation of costs that typically occurs during the years of construction is accounted for. Overnight costs are typically presented in terms of $/kw in the current year's dollars. Because this cost is presented in current year dollars, the cost value represents both a nominal and a present value cost.

On the other hand, "installed costs" typically refers to the total cost of the constructed project and does account for escalation of costs during the years of construction. Installed costs can be presented in terms of total dollars or $/kw and can be presented in terms of nominal dollars or present value dollars. However, the nominal and present value dollars values for installed costs will typically be different numeric values.

In his 2012 testimony, Dr. Jacobs attempted to make a comparison between a $5,190/kw overnight cost value in 2012$ for Turkey Point 6 & 7 and a $7,520/kw installed cost value he calculated for the Turkey Point subset of the EPU project. He assumed this cost was also in 2012$. Presumably because both values were presented in terms of 2012$, he assumed his comparison of an overnight cost to an installed cost represented a meaningful, apples-to-apples comparison.

In FPL's 2012 rebuttal testimonies, I first reminded Dr. Jacobs that his attempt to compare these two resource options, which have significantly different characteristics, on a $/kw basis could not provide meaningful results in regard to making resource decisions. (This issue had been extensively discussed in my rebuttal testimonies in the 2009 and 2010 NCRC dockets.) Then, both FPL witness Jones and I pointed out in our rebuttal testimonies that Dr. Jacobs' comparison was also not meaningful because he was attempting to compare two different types of costs. The $5,190/kw value for Turkey Point 6 & 7 was a projected overnight cost that did not include cost escalation that will occur during the years of project construction. The $7,520/kw value was a projected installed cost value for the Turkey Point subset of the EPU project that did include the cost escalation that had already been incurred throughout the construction process.

We pointed out that a more meaningful comparison (but still an inadequate comparison for making resource decisions) would be to compare installed costs for both projects. An installed cost for Turkey Point 6 & 7 of approximately $8,500/kw was presented. We recognized that both the $8,500/kw value and the $7,520/kw value are in nominal dollars, but that the in-service years are approximately 10 years apart. However, we believed then, and believe now, that it is more meaningful to at least attempt to compare projects using the same type of costs, even though the in-service years differ, than it is to try to compare projects using two completely different types of costs such as Dr. Jacobs attempted to do in 2012 with his discussion of overnight costs and installed costs. (However, as previously discussed, Dr. Jacobs in his 2013 testimony unfortunately chose to not only continue to attempt to compare two different types of costs, he decided to now use a third type of cost: "breakeven" costs.)

In his 2013 testimony, Dr. Jacobs attempted to explain/defend his attempt to compare two different types of costs in his 2012 testimony. In doing so, he made a couple of incorrect and/or misleading statements.

Q. Please discuss what Dr. Jacobs says in his 2013 testimony regarding this.

A. Dr. Jacobs states the following in his 2013 testimony:

- *"Dr. Sim asserted that the cost of EPU capacity completed at the present time should be compared to the cost of the Turkey Point Units 6&7 expressed in dollars that have been inflated over a period of some 10*

years. His assertion had no value, other than the fact that it was one way of trying to avoid the obvious conclusion that the Turkey Point EPU capacity was already more expensive than the corresponding cost of new nuclear capacity one year ago." (page 16, lines 6-11)

- *"Earlier, you alluded to Dr. Sim's use of 2013 dollars and 2022-2023 dollars in the same comparison. Can FPL justify the cost of the Turkey Point EPU project using that yardstick in this hearing cycle, which involves EPU project completion and close-out costs?"* (page 18, lines 21-23, and page 19, lines 1 and 2)

Q. What is your reaction to these statements?

A. In regard to the first statement, I disagree with Dr. Jacobs' characterization of my testimony from last year. What was actually stated in my 2012 rebuttal testimony was that Dr. Jacobs had made several mistakes. I first reminded Dr. Jacobs that an attempt to compare dissimilar projects on a $/kw basis could not provide meaningful results in regard to making resource decisions. Then FPL witness Jones and I pointed out that Dr. Jacobs had misunderstood a statement Mr. Jones had made which was in regard to installed costs for the EPU project and new nuclear units. Finally, we explained that Dr. Jacobs was mistakenly trying to compare projects using two different types of costs: overnight costs and installed costs.

The message Dr. Jacobs should have taken from this 2012 rebuttal testimony discussion was not that the correct way to analyze dissimilar projects is on a

$/kw basis using installed cost in nominal dollars. Instead, the message was that he would at least be slightly less wrong if he at least tried to compare projects using the same type of costs, rather than attempting to compare projects using two types of costs.

In regard to the second statement, Dr. Jacobs has posed a question which has a false premise. FPL is not trying to justify the cost of the completed EPU using a $/kw comparison to an unrelated project that is dissimilar in several key characteristics. As mentioned before, this fundamentally flawed approach is solely the creation of Dr. Jacobs.

Q. What was the statement in Dr. Jacobs' testimony that you wish to discuss regarding his claim that the FPSC might have made a different decision in 2012 if more current cost information had been discussed?

A. That statement is: *"(The actual expenditures for calendar year 2012 exceeded FPL's April 2012 estimate of $688 million by $287 million.) Had the FPSC known this information one year ago, it may have decided the issue of disallowance that OPC raised at that time differently."* (page 26, lines 3-6)

This statement follows earlier discussion by Dr. Jacobs in his testimony to the effect that one FPL projection of EPU 2012 expenditures for the Turkey Point subset was $688 million while actual expenditures eventually turned out to be $975 million; i.e., $287 million higher than projected. Dr. Jacobs also states that FPL witness Jones knew at the time of the 2012 hearing that $670 million

had already been spent during 2012. (These claims are rebutted by FPL witness Jones.) Dr. Jacobs concludes that if the FPSC had known about the expenditures already incurred up to the time of the hearing, the FPSC's decision about the economics of completing the EPU project might have been different.

Q. What is your opinion about Dr. Jacobs' statement that the FPSC *"may have decided...differently"*?

A. My opinion is that I do not believe it is likely that the FPSC would have come to a different decision. The basis for my opinion is a consideration of what the impact of already spent expenditures would have had on an updated version of FPL's 2012 feasibility analyses of the EPU project that logically would have been included in a discussion of already spent expenditures.

The 2012 feasibility analyses of the EPU project assumed that the cost component of the project related to the Turkey Point site was approximately $751 million. This value represented projected costs to be incurred from January 1, 2012 through December 31, 2012. It also represented projected total costs for the year including various costs (such as O&M and asbestos removal) that were not part of the $688 million cost value. The results of the 2012 feasibility analyses using the $751 million value were that completing the EPU project was projected to be cost-effective in 6 of 7 scenarios of fuel cost forecasts and environmental compliance cost forecasts.

However, if the 2012 feasibility analyses had been updated in August of 2012 to account for the fact that $670 million had already been spent by that time in 2012, those expenditures would then have been categorized as sunk costs. Consequently, these costs would have correctly been excluded from the updated feasibility analyses that examined whether completing EPU was projected to be cost-effective. The benefits side of the 2012 feasibility analysis would not have changed if this updated analysis had been performed, but the cost side would definitely have changed. The result would have been a significantly lower projection of costs to complete the project.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

AMENDED REBUTTAL TESTIMONY OF DR. STEVEN R. SIM

DOCKET NO. 130009 - EI

July 26, 2013

Q. Please state your name and business address.

A. My name is Steven R. Sim and my business address is Florida Power & Light Company, 9250 West Flagler Street, Miami, Florida 33174.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

Q. Are you sponsoring any rebuttal exhibits in this case?

A. Yes. I am sponsoring the following exhibit that is attached to my rebuttal testimony:

Exhibit SRS – 10: An Example of How Present Value Results From Projects With Different In-Service Dates Are Not Transferable

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to explain why a number of statements made by Office of Public Counsel (OPC) Witness Dr. Jacobs regarding the recently completed Extended Power Uprate (EPU) project are incorrect, and why a recommendation he makes is based on a fundamentally flawed attempt at analysis. Therefore, Dr. Jacobs' testimony is not reliable

and should not be given serious consideration by the Florida Public Service Commission (FPSC).

Q. How is your rebuttal testimony organized?

A. My rebuttal testimony is organized into three sections. Section I takes a look back at the completed EPU project and briefly discusses how it was proposed and approved, the results of the feasibility analyses of the project from 2007 on, and the fact that Dr. Jacobs has not disputed the consistent results of those analyses which project that FPL's customers will benefit from completing the overall EPU project. Section II takes a critical look at Dr. Jacobs' recommendation to impose a penalty on FPL. Section III then addresses a number of problematic statements made by Dr. Jacobs in his testimony that are not discussed in the prior two sections.

Q. Please summarize your rebuttal testimony.

A. The EPU project has now been completed and the additional 522 MW of nuclear capacity it has delivered is already benefiting FPL's customers. This additional nuclear capacity will continue to benefit FPL's customers for decades to come. In regard to the amount of additional nuclear capacity, the EPU project impressively overachieved by delivering approximately 120 MW, or approximately 30%, more capacity than was projected early in the project.

The EPU project was proposed to the FPSC as a single integrated project consisting of four nuclear units and two sites. The FPSC approved the project

on that basis. From the EPU need filing in 2007 through 2012, the last year before completion of the project, FPL's annual feasibility analyses have evaluated the EPU project as a single integrated project. The FPSC has relied upon these analyses of the EPU as a single integrated project in making their annual decisions regarding the feasibility of completing the project.

Each of these annual feasibility analyses of the EPU project showed that its completion was projected to be cost-effective in either 6 of 7, or in 7 of 7, scenarios of fuel cost forecasts and environmental compliance cost forecasts. Over this time period, the OPC, through Dr. Jacobs' testimonies, has not disputed the findings from any of the annual feasibility analyses, all of which indicated that the overall EPU project, as proposed by FPL and approved by the FPSC, was projected to be cost-effective for FPL's customers. Even now, in his 2013 testimony, Dr. Jacobs takes no issue regarding the cost-effectiveness of what the completed, integrated EPU project has delivered.

But now in 2013, in hindsight after the EPU project has been completed, OPC's witness Dr. Jacobs recommends that the FPSC impose a $200 million penalty on FPL. He bases such a penalty on his belief that a subset of the completed EPU, the portion of the EPU at the Turkey Point site, is *"clearly uneconomic"*. By making such an absolute statement, Dr. Jacobs is indirectly claiming that there are no possible future fuel costs, environmental compliance costs, operating lives of the nuclear units, regulations, legislation,

etc. by which the Turkey Point subset of the EPU project could possibly prove to be cost-effective. Dr. Jacobs' belief in his ability to predict future costs and circumstances with absolute accuracy decades into the future is, of course, nonsensical. Dr. Jacobs made a similar absolute statement of *"uneconomic"* last year in this testimony.

In his 2013 testimony, Dr. Jacobs attempts a new 'analysis' by which he hopes to justify his claim that this subset of the EPU can never be cost-effective. However, the key assumption in his attempt this year is that projected benefits from a different nuclear project (Turkey Point 6 & 7), that are presented in terms of breakeven costs for that specific project, are automatically applicable and transferable as breakeven costs for his selected subset of the recently completed EPU project. This is a fundamentally flawed assumption. The new nuclear project, and Dr. Jacobs' selected subset of the EPU project, share the title "nuclear", but that is about all they share. They have in-service dates that are 10 years apart, are of different capacity sizes, etc. In short, these are unrelated and separate projects. Consequently, results from the analysis of one project will not be applicable or automatically transferable to the other project.

This critical look at Dr. Jacobs' implied gift of prophecy regarding future fuel costs, environmental costs, legislation, etc., coupled with his fundamentally flawed assumption of 'one cost value fits all' in regard to nuclear projects that

he attempted to build his analysis around, result in completely discrediting his claim that the Turkey Point subset of the EPU project cannot, under any future circumstances, be cost-effective. Consequently, Dr. Jacobs' rationale for recommending a penalty for FPL has collapsed.

Dr. Jacobs' testimony also includes a number of statements that are incorrect and/or misleading. One of these is his attempt to portray FPL's exclusion of sunk costs in the feasibility analyses as something FPL concocted for the nuclear analyses. The reality is that excluding sunk costs is standard practice in economic analyses. The FPSC recognized this in providing direction that the costs to be used in the feasibility analyses are the costs to complete the project; i.e., costs that are separate from sunk costs. Furthermore, a co-panelist of Dr. Jacobs in a recent Georgia Power nuclear docket, and an author whose article on sunk costs Dr. Jacobs uses as a reference source in his 2013 testimony, both agree with FPL and the FPSC that sunk costs are properly excluded in economic analyses.

Dr. Jacobs' testimonies in 2012 and again in 2013 also tend to blur the distinctions between, and the meanings of, the commonly used terms 'overnight costs' and 'installed costs'. This has led to some confusing and/or misleading statements in his testimonies.

Dr. Jacobs also discusses the fact that at the time of the 2012 NCRC hearing, FPL had a more recent projection of EPU costs. He states that if this projection, that was not used in FPL's 2012 feasibility analyses, had been discussed at the 2012 hearing, then the FPSC *"may have"* reached a different decision in 2012. His selected projection showed that a large amount of expenditures had been made by the time of the 2012 hearing. However, what Dr. Jacobs fails to recognize is that FPL's 2012 feasibility analyses were based on a projection of expenditures from January 1, 2012 through December 31, 2012 as costs to complete the EPU project. If the 2012 feasibility analyses had been updated at the time of the 2012 hearing to recognize the expenditures that had already been spent in 2012 up to that point, then these expenditures would fall into the category of sunk costs and would have properly been excluded from the analyses. Consequently, the completion of EPU would have been projected to be even more cost-effective for FPL's customers in any updated analysis than it was in the "original" 2012 feasibility analyses.

Based on this summary of the many problems throughout Dr. Jacobs' testimony, I conclude that Dr. Jacobs' recommendation that a significant financial penalty be imposed upon FPL, and numerous other statements presented in his testimony, should be rejected by the FPSC in this docket.

Section I: A Look Back at the Completed EPU Project

Q. From a resource planner's perspective, how do you view the completed EPU project?

A. The EPU project is delivering approximately 522 MW of additional nuclear capacity that is currently benefiting FPL's customers and which will continue to benefit FPL's customers for at least several more decades. These incremental 522 MW for FPL's customers include approximately 120 MW, or approximately 30%, more capacity than what was projected in the early years of the project. (Note that the 522 MW value is also 10 MW more than was projected in FPL's May 2013 direct testimony. These additional 10 MW all come from the Turkey Point site.)

This incremental capacity of 522 MW already being delivered by the project has the following characteristics:

- firm capacity;
- baseload capacity with capacity factors of 90% or higher;
- produces energy with zero emissions of sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon dioxide (CO_2);
- produces energy using no fossil fuel, thus significantly contributing to fuel diversity for the FPL system;
- produces energy at very low costs due to the very low costs of nuclear fuel;

- the portion of the 522 MW of incremental capacity that is located at the Turkey Point site helps maintain a balance between growing electrical load in the Southeastern Florida region (Miami-Dade and Broward Counties) and generation located in that region; and,
- provides a valuable hedge against future increases in fossil fuel costs and increasing environmental compliance costs.

This combination of characteristics can only be provided by additional nuclear capacity and these characteristics are valuable to FPL's customers who are already benefiting from the project.

Q. Was the EPU project proposed to the FPSC in the 2007 Need filing as a single integrated project encompassing four nuclear units and two sites?

A. Yes.

Q. Did the FPSC approve the project as a single integrated project?

A. Yes.

Q. In all of the feasibility analyses of the EPU project that were presented to the FPSC since the 2007 Need filing, was the project always evaluated as a single integrated project?

A. Yes.

Q. Did the FPSC utilize these annual feasibility analyses of a single integrated EPU project as the basis for their annual decisions regarding EPU?

A. Yes.

Q. What were the results in all of these feasibility analyses presented to the FPSC annually since 2007 for the EPU project?

A. Completing the integrated EPU project was projected to be cost-effective for FPL's customers in each annual feasibility analysis in either 6 of 7, or in 7 of 7, scenarios of fuel cost forecasts and environmental compliance cost forecasts. (In those annual analyses in which completion of EPU was projected to be not cost-effective in a single scenario, that scenario always assumed low fuel costs and low environmental compliance costs would occur every year for several decades.)

Q. In his testimony, does Dr. Jacobs dispute the results of any of the annual EPU feasibility analyses since 2007 that consistently projected that completing the full integrated EPU project was cost-effective?

A. No.

Section II: A Critical Look at Dr. Jacobs' Recommendation

Q. Dr. Jacobs recommends that FPL be penalized by not being able to recover $200 million in EPU project expenditures. What do you understand the basis is for his recommendation?

A. The economic basis for his recommendation of a penalty is Dr. Jacobs' contention that the Turkey Point subset of the EPU project cannot be cost-effective. His testimony states this in the following passage: "*...the extremely expensive cost of the Turkey Point EPU capacity will be uneconomic to*

ratepayers. Therefore, I recommend that the Commission act to disallow some of these excessive and unreasonable costs." page 12, lines 17-19), from his direct testimony). However, I note that in his testimony, Dr. Jacobs does not explain which specific costs are 'excessive' or 'unreasonable', nor does he claim that any specific costs were imprudently incurred.

Q. How would you summarize the issue posed by Dr. Jacobs' testimony?

A. Dr. Jacobs is looking back at a project that: (i) has already been completed; (ii) is delivering approximately 30% more capacity than was originally estimated; (iii) is already benefiting FPL's customers; and (iv) whose overall project cost-effectiveness he has not challenged, but he nonetheless wants FPL penalized $200 million because he believes a subset of the project may not be cost-effective.

Q. What does Dr. Jacobs' testimony state regarding the economics of the Turkey Point subset of the overall EPU project?

A. In addition to the statement provided above, Dr. Jacobs' perception of the economics of this subset of the overall EPU project is perhaps best summed up by the following two statements:

- *"The Turkey Point EPU...is clearly uneconomic for FPL's customers."* (page 18, line 3); and,
- *"...on a stand-alone basis the Turkey Point EPU project is clearly uneconomic and harmful to FPL customers."*(page 22, lines 5 and 6)

Based on these statements, Dr. Jacobs is essentially claiming that he knows with certainty that this subset of the overall EPU project cannot, under any possible future circumstances, be cost-effective. He makes this claim even though it is obvious that the actual benefits realized by the EPU will not be known for decades.

Q. What is your reaction to such a claim?

A. Frankly, I am amazed that anyone who has been involved, even on the periphery, of the electric utility industry as long as Dr. Jacobs' résumé indicates he has been involved, would be willing to indicate, even indirectly, that he/she knows with absolute certainty what future fuel costs, environmental costs, operating lives of nuclear units, regulation, legislation, etc. will be over the next several decades. Yet one would have to be making just that claim if one is stating (repeatedly) that a subset of a project is *"clearly uneconomic"* when the future outcomes of all of the items listed above will determine the actual benefits that the EPU project will provide to FPL's customers.

Even a quick review of the fuel cost and environmental compliance cost forecasts used in the annual feasibility analyses presented to the FPSC from 2007 to the present would show changes, with some of the changes being significant changes, in these forecasts from year-to-year. In addition, the FPSC expects forecasts of these costs to continually change and thus instructed the utilities to update these forecasts each year in their feasibility

analyses. Furthermore, FPL's annual feasibility analyses recognize that there is great uncertainty in these future costs and addresses that uncertainty by using multiple scenarios of fuel cost forecasts and environmental compliance costs forecasts in its feasibility analyses. Thus uncertainty regarding future fuel costs, future environmental compliance costs, etc. is recognized by the FPSC and FPL.

However, Dr. Jacobs must believe that he knows what these future costs will be with such certainty that it is clear to him (and likely only to him) exactly what the benefits of a subset of the overall EPU project will be over these decades. Such a belief is obviously nonsensical.

Q. **Despite Dr. Jacobs' belief that he can predict the future with certainty, has FPL examined what certain changes in some of these key forecasts or assumptions would mean in regard to additional benefits for the EPU project?**

A. Yes. Dr. Jacobs made similar absolute 'can't be economic' claims in his testimony last year (thus clearly indicating this year that he has an ongoing belief in his psychic abilities – despite the fact that the 2012 fuel cost forecast that was the basis for the 2012 projection of EPU fuel cost benefits has changed in 2013). FPL pointed out last year in rebuttal testimony that no one can possibly predict future fuel costs, environmental compliance costs, operating licenses of nuclear units, regulation, legislation, etc. over the next

several decades accurately enough to make such definitive statements as Dr. Jacobs is making.

In order to demonstrate how much the projected benefits for the EPU project could change, my 2012 rebuttal testimony made the following points regarding how the projected benefits for EPU could quickly and dramatically change:

- changing the 2012 fuel cost forecast to the fuel cost forecast used in feasibility analyses just two years earlier increased the EPU's projected fuel savings by $430 million CPVRR;
- changing the 2012 environmental compliance cost forecast to a forecast used in feasibility analyses just one year earlier increased the EPU's projected environmental compliance cost savings by $250 million CPVRR;
- if the operating licenses for the four nuclear units were extended for 20 more years, the increase in just the projected fuel cost and environmental compliance cost savings alone for EPU, compared to that presented in the 2012 feasibility analyses, would be $1,200 million CPVRR; and,
- if a Clean Energy Standard is imposed which has a 'nuclear neutral' provision, the net savings in renewable energy costs that would

otherwise be incurred without the incremental EPU capacity were projected to be $192 million CPVRR.

Therefore, what is truly clear is that not only do forecasts of fuel costs, environmental costs, etc. continually change, but that these changes can have significant impacts on the projected benefits of the EPU project. And, because the most recent forecasted values for fuel costs and environmental compliance costs are at the low end of costs forecasted since the NCRC dockets began, I believe that any significant changes in these costs which occur in the future are likely to be in the direction of higher costs; i.e., towards higher benefits for EPU.

Q. Did Dr. Jacobs perform any rigorous feasibility analysis of his own to demonstrate his claim that the Turkey Point subset of the EPU project could never be economic and present the results of that analysis in his testimony?

A. No.

Q. What did he attempt to do to support his claim?

A. I believe the following four statements provide a good summary of what Dr. Jacobs is attempting to use as a justification for his claim that the Turkey Point subset of the completed EPU can never be economic under any future circumstance:

- *"This is what he calls the nuclear 'breakeven cost'."* (page 14, lines 19 and 20)

- *"If, as Dr. Sim contends, his breakeven calculation quantifies the maximum installed cost of new nuclear capacity that is cost-effective, then it follows that Turkey Point uprate capacity must cost less than the breakeven value to be cost-effective."* (page 13, lines 17 – 19)
- *"The cost of the EPU capacity, which was completed in early 2013, is expressed in current 2013 dollars. Dr. Sim's "breakeven costs" are also expressed in 2013 dollars, so the numbers are "apples to apples."* (page 16, lines 10 - 12)
- *"The St. Lucie EPU project, at $3,800/kW is well below all the breakeven cost scenarios and thus, using Dr. Sim's logic, is economic."* (page 16, line 22 and page 17, lines 1 and 2)

From these statements, it is clear that what Dr. Jacobs is attempting to do is to take the benefits calculation results from one project, let's call it Project A (i.e., Turkey Point 6 & 7), and apply those results to Project B (the Turkey Point subset of EPU).

Q. Does this approach make sense?

A. No. Let's examine the first of his statements quoted above: *"This is what he calls the nuclear 'breakeven cost'."* (The "he" in this statement is me.) Dr. Jacobs is referring to a projected breakeven cost calculated specifically for the Turkey Point 6 & 7 project. That breakeven cost is consistently labeled and referred to in my direct testimony as a value calculated for the Turkey Point

6 & 7 project. It is never portrayed as a universally applicable value for all nuclear projects.

However, Dr. Jacobs appears to assume that because both projects have the word "nuclear" in their title, then the numeric results of a calculation for one nuclear project are automatically applicable and transferable to any other nuclear project. He uses the highest projected breakeven cost value ($6,640/kw) in 2013$ for Project A (Turkey Point 6 & 7) and claims that if the cost for Project B (a subset of the already completed EPU) exceeds that value, then Project B cannot be economic. (Contrary to Dr. Jacobs' characterization of this approach as *"...using Dr. Sim's logic..."*, this illogical approach is entirely Dr. Jacobs' creation. And as far as the 'logic' part of his description goes, the best description of his approach is 'tortured' logic.)

His lack of understanding of how resource planning analyses should actually be performed to provide meaningful results is perhaps understandable. In his testimony, Dr. Jacobs describes his activities since 1986 on page 3, lines 3-5, as participating in *"...rate case and litigation support activities related to power plant construction, operation and decommissioning."* Noticeably absent from his description of his work experience is anything remotely associated with electric utility resource planning. If he really does not have a significant amount of resource planning knowledge and experience, then it is

understandable why his attempt at applying this 'analysis' approach is so misguided.

Economic analyses of different projects or resource options simply don't have automatically applicable or transferable results in the manner Dr. Jacobs believes they do. In previous NCRC dockets, FPL has explained that a comparison of resource options on a $/kwh basis, or on a $/kw basis (as Dr. Jacobs attempts to do), is meaningless in regard to making a final decision about resource options unless the resource options in question are identical, or nearly identical, in each of a number of characteristics.

The two resource options in question, Turkey Point 6 & 7 and a subset of EPU, are not even close to being identical in regard to several of these key characteristics including in-service dates and capacity (MW). Differences in these key characteristics mean that the impacts the two resource options will have on the FPL system will be significantly different. Therefore, the economics of these two resource options cannot be meaningfully evaluated based on a $/kw comparison and the results from an economic analysis of one resource option are not applicable or automatically transferable to the other resource option.

For example, consider the fact that the in-service date of Project A is a decade later than the already in-service Project B. This means that Project B's

impacts for the first 10 years will be on an FPL system (i.e., the fleet of generating units, power purchases, DSM, etc.) that is markedly different than the FPL system that Project A will impact when it begins service 10 years later. In addition, the 10-year difference in in-service dates means that the discounting of benefits will have different impacts on determining breakeven costs for Project A and Project B.

Consequently, his misguided assumption that the $6,640/kw breakeven cost in 2013$ for Turkey Point 6 & 7 with an in-service date of 2022/2023 is applicable and automatically transferable to EPU which is already in-service is fundamentally flawed.

Q. Would you please provide a simple example showing that the numeric results from economic analyses of two resource options or projects that are dissimilar in even one of the key characteristics are not automatically transferable?

A. Yes. The simple example is provided in Exhibit SRS – 10. In order to keep the example as simple as possible, the example looks at only one hypothetical project with two different in-service years: 2013 and 2022. For simplicity's sake, we will also assume that the project cost and project benefits all occur in a single year (the in-service year). We further assume that the cost of the project will be incurred in one day so that there is no difference between overnight costs and installed costs. We use the same discount rate of 7.45%

that was used in FPL's 2013 feasibility analyses. Two different scenarios are examined.

In both scenarios, we start by looking at the project with a 2013 in-service date. If we assume that the total benefits of the project are, for example, $1,000,000 in nominal dollars (which are also $1,000,000 in net present value 2013$ because the benefits occur in 2013), then the breakeven cost for the 2013 project is $1,000,000 both in terms of nominal and NPV dollars. This is shown in Column (3) in the exhibit in both the upper and lower halves of the page.

Now let's move the same project out in time so that it has a 2022 in-service date. In Scenario 1, presented in the top half of the exhibit, we assume that the nominal savings remain at $1,000,000 in the year 2022 as shown in Column (5). Therefore, the nominal breakeven cost will remain at $1,000,000. However, after discounting this nominal value back to 2013, the 2013$ present value breakeven cost becomes $523,772 as shown in Column (6), not the $1,000,000 value of the 2013 in-service project. Clearly the present value 2013$ breakeven costs of the two projects are neither identical nor transferable.

In Scenario 2, presented on the bottom half of the exhibit, we assume that the avoided costs (i.e., the benefits) escalate over the 10 year period from 2013 to

2022 by an escalation rate of 2.5% per year. Now the nominal benefits increase from $1,000,000 to $1,248,863 as shown in Column (8). Similarly, the present value 2013$ benefits increase to $654,119 as shown in Column (9). In this scenario the 2013$ benefits value again represents the 2013$ breakeven cost. However, this 2013$ present value breakeven cost of $654,119 is still not the same as the $1,000,000 breakeven cost value in 2013$ for the 2013 in-service project. Therefore, again in this scenario the breakeven costs are neither identical nor transferable.

This simple example demonstrates that Dr. Jacobs' attempt at selecting a breakeven cost value for one project, then using it as a standard by which to judge the economics of another project that is dissimilar in regard to even one key characteristic (in-service date), is fundamentally flawed (even if the two resource options have the word "nuclear" in their titles).

Section III: Other Problematic Statements

Q. Were there problems in other statements or claims made in Dr. Jacobs' testimony that have not yet been addressed?

A. Yes. Dr. Jacobs' testimony contains a number of problematic statements that address three topics: (i) the exclusion of sunk costs in economic analyses, (ii) the difference between installed and overnight costs, and (iii) whether the

FPSC would have made a different decision last year if a different EPU cost projection had been discussed at the hearing.

Q. What statements do you wish to discuss from Dr. Jacobs' testimony regarding the exclusion of sunk costs in economic analyses?

A. These statements include:

- *"I challenged FPL's methodology for gauging the economic feasibility of its uprates, which involved excluding past expenditures from the study."* (emphasis added) (page 7, line 23, and page 8, lines 1 and 2);
- *"...considering the future construction and related costs alone (in other words, consistent with FPL's preferred feasibility methodology)..."* (emphasis added) (page 11, lines 17 - 19); and,
- *"...based even on Dr. Sim's flawed insistence on ignoring sunk costs."*(emphasis added) (page 21, lines 21 and 22).

Dr. Jacobs is clearly trying to portray the exclusion of sunk costs in economic analyses as something that FPL or I dreamed up for use in the EPU analyses. Nothing could be further from the truth.

Q. Please elaborate.

A. The practice of excluding costs that have already been spent (i.e., sunk costs) in economic analyses is standard practice because such costs are obviously immaterial in regard to a decision regarding whether to proceed with a project. Three points should help demonstrate the fact that excluding sunk costs is standard practice and not an FPL contrivance.

First is the fact that the FPSC provided early direction in regard to how to account for costs in feasibility analyses of nuclear projects. Their direction was that the costs to include in the analyses are the costs to complete the project. The costs to complete are clearly separate from costs that have already been spent. Thus the FPSC has recognized that the costs to complete the project, not costs already spent, are the appropriate costs to include in feasibility analyses and they directed the utilities to act accordingly in their analyses.

Second is the fact that in a recent (2009) nuclear docket in Georgia, a panel consisting of Dr. Jacobs and Mr. Hayet was asked a question regarding the fact that Georgia Power excludes sunk costs in their economic analyses. Mr. Hayet provided the panel's response:

> *"The point there is just to point out that the economic analysis as you go forward with the project, the question that you have to answer is what are the future costs that will be incurred and what do those costs – how do those costs compare to your next best alternative. So, the notion of the costs that have already been spent as being sunk is something that you do ignore and we're just simply pointing that out, that's the company's practice, we agree with it and that's fairly industry standard."* (page 202,

lines 23-25 and page 203, lines 1-7; Georgia Public Service Commission Docket No. 29849)

Third is the article on sunk costs by Mr. Charles Conway that Dr. Jacobs included as Exhibit WRJ - 7 to his direct testimony. On page 1 of 5, third paragraph of this exhibit/article, Mr. Conway states:

"Sunk costs are money that you've already spent on one of the options, before making the decision. Regardless of which option you choose, the money has already been spent. That money is, for all intents and purposes, gone. If you choose option A, the money is spent. If you choose option B, the money is spent. If you choose to do nothing, the money has still been spent. The result is that sunk costs should not be considered in your decisions. Sunk costs do not alter the future costs and revenues of your options, so they should not be included in the analysis."

Thus other parties, including the FPSC, a co-panelist of Dr. Jacobs in another nuclear docket, and an author selected by Dr. Jacobs to serve as a reference source for his testimony this year, all agree with FPL that excluding sunk costs from economic analyses is the correct approach, even if Dr. Jacobs does not.

Q. Are there also problematic statements in Dr. Jacobs' testimony regarding certain terminology such as overnight costs and installed costs?

A. Yes. I believe there were problems relating to these terms in his 2012 testimony. FPL pointed these problems out in its 2012 rebuttal testimony. Unfortunately, Dr. Jacobs attempts to defend his 2012 choice of types of costs to use for a comparison in his 2013 testimony and this may have created confusion for readers of his 2013 testimony.

Q. An attempt to clear up this confusion regarding terminology would be helpful. Please start with providing simple definitions, and then discuss what the 2012 testimonies presented.

A. Both of these terms refer to the cost of construction, but the terms refer to different types of costs. In simple terms, "overnight cost" (or "overnight construction cost") refers to the cost if one could literally build a project overnight. Therefore, no escalation of costs that typically occurs during the years of construction is accounted for. Overnight costs are typically presented in terms of $/kw in the current year's dollars. Because this cost is presented in current year dollars, the cost value represents both a nominal and a present value cost.

On the other hand, "installed costs" typically refers to the total cost of the constructed project and does account for escalation of costs during the years of construction. Installed costs can be presented in terms of total dollars or $/kw and can be presented in terms of nominal dollars or present value dollars. However, the nominal and present value dollars values for installed costs will typically be different numeric values.

In his 2012 testimony, Dr. Jacobs attempted to make a comparison between a $5,190/kw overnight cost value in 2012$ for Turkey Point 6 & 7 and a $7,520/kw installed cost value he calculated for the Turkey Point subset of the EPU project. He assumed this cost was also in 2012$. Presumably because both values were presented in terms of 2012$, he assumed his comparison of an overnight cost to an installed cost represented a meaningful, apples-to-apples comparison.

In FPL's 2012 rebuttal testimonies, I first reminded Dr. Jacobs that his attempt to compare these two resource options, which have significantly different characteristics, on a $/kw basis could not provide meaningful results in regard to making resource decisions. (This issue had been extensively discussed in my rebuttal testimonies in the 2009 and 2010 NCRC dockets.) Then, both FPL witness Jones and I pointed out in our rebuttal testimonies that Dr. Jacobs' comparison was also not meaningful because he was attempting to compare two different types of costs. The $5,190/kw value for Turkey Point 6 & 7 was a projected overnight cost that did not include cost escalation that will occur during the years of project construction. The $7,520/kw value was a projected installed cost value for the Turkey Point subset of the EPU project that did include the cost escalation that had already been incurred throughout the construction process.

We pointed out that a more meaningful comparison (but still an inadequate comparison for making resource decisions) would be to compare installed costs for both projects. An installed cost for Turkey Point 6 & 7 of approximately $8,500/kw was presented. We recognized that both the $8,500/kw value and the $7,520/kw value are in nominal dollars, but that the in-service years are approximately 10 years apart. However, we believed then, and believe now, that it is more meaningful to at least attempt to compare projects using the same type of costs, even though the in-service years differ, than it is to try to compare projects using two completely different types of costs such as Dr. Jacobs attempted to do in 2012 with his discussion of overnight costs and installed costs. (However, as previously discussed, Dr. Jacobs in his 2013 testimony unfortunately chose to not only continue to attempt to compare two different types of costs, he decided to now use a third type of cost: "breakeven" costs.)

In his 2013 testimony, Dr. Jacobs attempted to explain/defend his attempt to compare two different types of costs in his 2012 testimony. In doing so, he made a couple of incorrect and/or misleading statements.

Q. Please discuss what Dr. Jacobs says in his 2013 testimony regarding this.

A. Dr. Jacobs states the following in his 2013 testimony:

- *"Dr. Sim asserted that the cost of EPU capacity completed at the present time should be compared to the cost of the Turkey Point Units 6&7 expressed in dollars that have been inflated over a period of some 10*

years. His assertion had no value, other than the fact that it was one way of trying to avoid the obvious conclusion that the Turkey Point EPU capacity was already more expensive than the corresponding cost of new nuclear capacity one year ago." (page 15, lines 20-23, and page 16, lines 1 and 2)

- *"Earlier, you alluded to Dr. Sim's use of 2013 dollars and 2022-2023 dollars in the same comparison. Can FPL justify the cost of the Turkey Point EPU project using that yardstick in this hearing cycle, which involves EPU project completion and close-out costs?"* (page 18, lines 13 - 17)

Q. What is your reaction to these statements?

A. In regard to the first statement, I disagree with Dr. Jacobs' characterization of my testimony from last year. What was actually stated in my 2012 rebuttal testimony was that Dr. Jacobs had made several mistakes. I first reminded Dr. Jacobs that an attempt to compare dissimilar projects on a $/kw basis could not provide meaningful results in regard to making resource decisions. Then FPL witness Jones and I pointed out that Dr. Jacobs had misunderstood a statement Mr. Jones had made which was in regard to installed costs for the EPU project and new nuclear units. Finally, we explained that Dr. Jacobs was mistakenly trying to compare projects using two different types of costs: overnight costs and installed costs.

The message Dr. Jacobs should have taken from this 2012 rebuttal testimony discussion was not that the correct way to analyze dissimilar projects is on a $/kw basis using installed cost in nominal dollars. Instead, the message was that he would at least be slightly less wrong if he at least tried to compare projects using the same type of costs, rather than attempting to compare projects using two types of costs.

In regard to the second statement, Dr. Jacobs has posed a question which has a false premise. FPL is not trying to justify the cost of the completed EPU using a $/kw comparison to an unrelated project that is dissimilar in several key characteristics. As mentioned before, this fundamentally flawed approach is solely the creation of Dr. Jacobs.

Q. What was the statement in Dr. Jacobs' testimony that you wish to discuss regarding his claim that the FPSC might have made a different decision in 2012 if more current cost information had been discussed?

A. That statement is: *"(The actual expenditures for calendar year 2012 exceeded FPL's April 2012 estimate of $688 million by $287 million.) Had the FPSC known this information one year ago, it may have decided the issue of disallowance that OPC raised at that time differently."* (page 21, lines 6 - 9)

This statement follows earlier discussion by Dr. Jacobs in his testimony to the effect that one FPL projection of EPU 2012 expenditures for the Turkey Point

subset was $688 million while actual expenditures eventually turned out to be $975 million; i.e., $287 million higher than projected. Dr. Jacobs also states that FPL witness Jones knew at the time of the 2012 hearing that $670 million had already been spent during 2012. (These claims are rebutted by FPL witness Jones.) Dr. Jacobs concludes that if the FPSC had known about the expenditures already incurred up to the time of the hearing, the FPSC's decision about the economics of completing the EPU project might have been different.

Q. What is your opinion about Dr. Jacobs' statement that the FPSC *"may have decided...differently"*?

A. My opinion is that I do not believe it is likely that the FPSC would have come to a different decision. The basis for my opinion is a consideration of what the impact of already spent expenditures would have had on an updated version of FPL's 2012 feasibility analyses of the EPU project that logically would have been included in a discussion of already spent expenditures.

The 2012 feasibility analyses of the EPU project assumed that the cost component of the project related to the Turkey Point site was approximately $751 million. This value represented projected costs to be incurred from January 1, 2012 through December 31, 2012. It also represented projected total costs for the year including various costs (such as O&M and asbestos removal) that were not part of the $688 million cost value. The results of the 2012 feasibility analyses using the $751 million value were that completing

the EPU project was projected to be cost-effective in 6 of 7 scenarios of fuel cost forecasts and environmental compliance cost forecasts.

However, if the 2012 feasibility analyses had been updated in August of 2012 to account for the fact that $670 million had already been spent by that time in 2012, those expenditures would then have been categorized as sunk costs. Consequently, these costs would have correctly been excluded from the updated feasibility analyses that examined whether completing EPU was projected to be cost-effective. The benefits side of the 2012 feasibility analysis would not have changed if this updated analysis had been performed, but the cost side would definitely have changed. The result would have been a significantly lower projection of costs to complete the project.

Q. Does this conclude your testimony?

A. Yes.

BY MS. CANO:

Q. Did you prepare summaries of both of your Direct and Rebuttal Testimony?

A. Yes.

Q. Would you please provide both of those summaries to the Commission at this time?

A. Yes, I will.

Good afternoon, Chairman Brisé and Commissioners. My Direct Testimony presents the results of FPL's economic feasibility analysis for the Turkey Point 6 and 7 project, and briefly discusses the benefits associated with the completed EPU project.

FPL's 2013 feasibility analysis of Turkey Point 6 and 7 again uses a multiple forecast multiple scenario approach that addresses a wide range of potential future fuel and environmental costs. All major assumptions, including fuel costs, environmental costs, and load forecast have been reviewed and updated as needed.

In its feasibility analyses, FPL compares the cost to its customers of a resource plan that includes Turkey Point 6 and 7 with a resource plan that excludes Turkey Point 6 and 7 and adds instead additional natural gas-fired capacity. The resource plan with Turkey Point 6 and 7 is projected to be the clear economic winner for

FPL's customers.

In addition, Turkey Point 6 and 7 is projected to provide other significant benefits to FPL's customers through increased system diversity, reduced system fossil fuel use, additional firm capacity, and greatly reduced system emissions, a combination of benefits unique to nuclear generation.

The results of FPL's 2013 feasibility analyses of Turkey Point 6 and 7 can be summarized as follows: Turkey Point 6 and 7 is projected to be cost-effective in five of seven fuel and environmental cost scenarios. In the remaining two scenarios, which assume low environmental costs, or lower environmental costs and low fuel costs for the next 50 years, the projected break-even capital cost for Turkey Point 6 and 7 are within the nonbinding estimated capital cost range.

FPL's customers are projected to save approximately 78 billion in nominal fuel costs over the life of the project. Other projections include that FPL's reliance on natural gas will be reduced by approximately 13 percent in the first full year of the project and approximately 265 million tons of CO2 emissions will be eliminated over the life of the units.

In regard to the completed EPU project, the project actually delivered greater than 100 megawatts

more of new nuclear capacity to FPL's customers than was originally projected. The EPU work is already benefiting FPL's customers through significant annual fuel savings that are projected to total approximately $3.4 billion nominal.

In addition, FPL's customers are benefiting from lower system air emissions, greater fuel diversity, and additional firm capacity advantageously sited in Southeastern Florida.

In conclusion, the additional nuclear generation delivered by the completed EPU work is providing significant benefits to FPL customers and will do so for decades to come. Similarly, the results of the 2013 feasibility analyses show that Turkey Point 6 and 7 continues to be projected as a cost-effective addition for FPL's customers, thus supporting the continuation of the project.

Thank you. That concludes the oral summary of my Direct Testimony.

Shall I proceed to the Rebuttal?

CHAIRMAN BRISÉ: Please do.

THE WITNESS: Good afternoon, again.

My rebuttal testimony addresses the direct testimony of OPC Witness Jacobs, who with the EPU project now completed and delivering 30 percent more

capacity than originally projected, recommends that a financial penalty be imposed on FPL. His recommendation is based in part on a claim that the Turkey Point subset of the integrated EPU project can never be economic.

His argument is fundamentally flawed in at least two ways. First, Witness Jacobs believes that the Turkey Point subset of EPU can never be economic, despite the fact that the future is highly uncertain. The economics of nuclear capacity are driven by many factors, including future fuel cost, future environmental cost, future decisions regarding nuclear plant licenses, et cetera. All of these future costs or outcomes are highly uncertain. Therefore, for Doctor Jacobs to claim even indirectly that he has enough certainty regarding these future costs and outcomes to declare that this subset of nuclear capacity cannot be economical is nonsensical.

Witness Jacobs then attempts to demonstrate that this subset of the EPU project cannot be economic by comparing its cost to the projected break-even cost for an unrelated and dissimilar project, Turkey Point 6 and 7. In previous NCRC dockets, FPL has repeatedly advised all parties that one cannot meaningfully compare the economics of dissimilar resource options using a cost-only basis of comparison, whether cents per

kilowatt hour, dollars per kW, et cetera. Yet that is what Witness Jacobs attempts to do.

Other than the words nuclear in their names, EPU and Turkey Point 6 and 7 are very dissimilar projects. With, for example, their in-service dates being a decade apart. Therefore, the economics of one project are neither identical to nor automatically transferable to another dissimilar project. In sum, Witness Jacobs' comparison is not a valid or meaningful economic analysis.

In conclusion, Witness Jacobs' belief that he knows future fuel costs, environmental costs, et cetera, over the next few decades so well that he can state with absolute certainty that a project cannot be economic does not warrant serious consideration. Furthermore, his belief that the break-even costs for one project are automatically transferable to another dissimilar project is fundamentally flawed. For these reasons, Witness Jacobs' attempt at constructing an economic basis for a financial penalty has collapsed. Therefore, his recommendation for a penalty should be rejected.

Thank you.

CHAIRMAN BRISÉ: Thank you.

MS. CANO: FPL tenders the witness for cross-examination.

CHAIRMAN BRISÉ: Okay. OPC.

MR. McGLOTHLIN: Consistent with our stipulation, we'll address this in the brief.

CHAIRMAN BRISÉ: Okay. Thank you.

FIPUG.

MR. MOYLE: No questions.

CHAIRMAN BRISÉ: All right. Thank you.

Mr. Cavros, SACE.

MR. CAVROS: Thank you, Chairman.

CROSS EXAMINATION

BY MR. CAVROS:

Q. Good afternoon, Doctor Sim.

A. Good afternoon, sir.

Q. You have been with FPL since 1979, is that right?

A. Yes.

Q. Okay. So you have been with the company for roughly 34 years?

A. Yes.

Q. I ask you that because I know you have a Master's in math.

A. I could get pretty to it.

Q. And your duties during that time have included the development of demand-side management programs, is that correct?

A. Yes, that's correct.

Q. Uh-huh. And your duties also include supervising the magnitude and timing of the company's resource needs, is that right?

A. Supervising and coordinating the analysis that lead to answering those questions, yes.

Q. Okay. And once those resource needs are identified, then you develop a plan to meet those needs, is that correct?

A. We attempt to identify the best resource plan with which to meet those needs, yes.

Q. Okay. So I just want to make sure -- I'm going to try to keep this -- I'm going to try to dumb this down a little bit.

So essentially you go through a two-step process in your planning process. One is to identify the magnitude and timing of the resource need, and then the other one is to develop a plan to meet that need?

A. Yes.

Q. Is that fair? Okay. And, additionally, you discuss FPL's so-called portfolio approach to resource planning in your testimony, is that right?

A. That's correct.

Q. Okay. Then I'm talking to the right person.

You are offered as a witness today to discuss

the assumptions that are used in the 2013 feasibility analysis, is that correct?

A. At least in part, yes.

Q. Okay. And that includes DSM assumptions?

A. Yes.

Q. Okay. And on Page 3 of your testimony you state the completion of the reactors at Turkey Point 6 and 7 continues to be the economic choice for FPL customers, is that correct?

A. Yes.

Q. Okay. And do you still stand by that statement?

A. I do.

Q. All right. Turkey Point 6 and 7 is a baseload plant, right?

A. They will be baseload units, yes.

Q. And the definition of a baseload plant is one that meets continuous energy demand and produces energy at a constant rate, does that sound about right?

A. Roughly correct. It will operate at a very high capacity factor over the year.

Q. Okay. And your fuel mix for generating electricity is comprised primarily of natural gas and nuclear power, is that correct?

A. Yes, primarily natural gas.

Q. Okay. And what percentage of your electricity do you generate with natural gas?

A. Ballpark, it's roughly two-thirds.

Q. Okay. About 67 percent?

A. Give or take a few percentage points, yes.

Q. Okay. And what percentage of electricity do you generate now with nuclear power with the uprates included?

A. I haven't done a calculation within the last few months, but ballpark 20 percent.

Q. Okay. If you could turn to Page 6 of your May 1st testimony, and if I could point your attention -- direct your attention to Line 7. You say that FPL strives for diversity in regard to system resources, is that right?

A. Strives for diversity in regard to system resources and fuels, yes.

Q. Okay. And several of the reasons cited by you in your testimony in support of the proposed new reactors include, number one, that the project produces no SO2 emissions, correct?

A. While the unit is running, that's correct.

Q. And while it's running it produces no nitrogen oxide emissions, correct?

A. Correct.

Q. And while it's running it produces little or no CO2 emissions, is that correct?

A. That's correct.

Q. Okay. And it also serves as a hedge against fossil fuel price volatility, is that right?

A. Among other things, yes.

Q. Okay. I want to direct your attention to Page 18 of your testimony, if I could. Around Line 17, the discount rate that's assumed in the feasibility analysis is 7.45 percent, correct?

A. That's correct.

Q. Okay. And that's comprised of a return on equity, a return to your shareholders of 10-1/2 percent, correct?

A. Yes.

Q. Okay. And FPL's shareholders earn a rate of return on capital investments in a nuclear plant, correct?

A. I'm sorry, can you repeat the question, please.

Q. Sure. FPL's shareholders earn a rate of return on capital investments like a nuclear plant?

A. Yes. Assuming the costs have been deemed prudent and recoverable, yes.

Q. Okay. And FPL's shareholders also earn a rate

of return on the capital investment in natural gas plants, for instance, assuming it is operational?

A. Operational and deemed prudent and recoverable, yes.

Q. Okay. And FPL's shareholders don't earn a rate of return on energy efficiency programs, is that correct?

A. In regard to certain DSM programs they do earn a rate of return on the capital portion. In general, for energy efficiency programs, the answer -- I would agree with your statement.

Q. Okay. Are you familiar with the term levelized cost?

A. In general, yes.

Q. I figured you would be. Essentially, it's the net present value of constructing and operating a resource over its lifetime. Is that a short and kind of accurate description of it?

A. Are you referring to the commonly used term levelized cost of electricity?

Q. Yes.

A. Yes, it is the cost of building and operating a unit by itself as if it were unconnected to the utility system as a whole. So as if it were a resource option out in a field somewhere by itself.

Q. Understood. And that can be expressed in cost per kilowatt hours, is that correct?

A. Yes.

Q. All right. FPL's retail rate is about 11-1/2 cents per kilowatt hour, is that right?

A. It would be close, yes.

Q. Okay. And FPL's avoided cost for energy is approximately -- and I can see I haven't looked at a tariff sheet recently, but is about three cents per kilowatt hour, is that fair?

A. I cannot give you a current number. I haven't looked at it in a while.

Q. All right. Would it be in the ballpark to say it is anywhere from three to five cents a kilowatt hour?

A. Subject to check, yes.

Q. Okay. Now, the proposed Turkey Point project is going to have a rate impact, right?

A. Yes, all resource options added to the system will have a rate impact.

Q. Okay. In fact, it's already having impacts, is that correct?

A. That's correct.

Q. Okay. And the levelized cost of the project, not accounting for any cost increases, is going to be about -- well, a little over 15 cents per kilowatt hour,

is that correct?

A. I'm sorry, I couldn't hear the first part of your question.

Q. Sure. The levelized cost for the proposed project is going to be a little over 15 cents per kilowatt hour, is that correct?

A. I would disagree with that. Because that calculation, again, looks only at the cost of building and operating the unit and does not take into account the impact on the system, for example, for Turkey Point 6 and 7 the savings in fuel costs, the savings in environmental costs, the savings in transmission, et cetera.

Q. Right. Notwithstanding that, the levelized cost of the proposed project is going to be 15 cents per kilowatt hour or a little bit over that, is that correct?

A. For a 90 percent capacity factor that's about right. But, again, that is an incomplete way to look at resource options. It looks at the cost of building and operating, not the net cost of building and operating.

Q. So is it fair to say that the plant will place upward pressure on rates?

A. Like all resource options, it will likely put upward pressure on rates in the early years. And

certainly for Turkey Point 6 and 7, it will put downward pressure on rates for many more years than it will upward pressure on rates.

Q. Okay. And isn't it fair to say that how you described the initial upward pressure on rates and then downward pressure on rates can also be applied to utility-sponsored energy efficiency programs?

A. Yes. Energy-efficiency programs typically put upward pressure on rates in the early years, and depending upon how cost-effective they are, they may put downward pressure on rates in the later years. But some DSM programs do not, it is upward pressure on rates throughout.

Q. Okay. And your job as a resource planner is to determine which resource options lower FPL's overall system costs for FPL customers, is that accurate?

A. No, I would not look at it that way. I would say we look at resource options from both an economic and a noneconomic standpoint. From an economic standpoint or perspective, we look at resource options that provide our customers reliable service at the lowest possible electric rates, not necessarily the lowest possible cost. We also look at resource options in regard to certain things such as fuel diversity, in regard to assisting in regional reliability aspects,

et cetera. So there are many aspects of resource planning.

Q. So for all system costs, it's just one of those considerations?

A. System cost is a component, yes.

Q. You mentioned fuel diversity is one; regional reliability is another, is that correct?

A. Electric rates was another.

Q. Uh-huh.

A. Hedges against future environmental costs and fuel costs would be another.

Q. Great. I want to talk a little bit about your integrated resource planning process, and let's go through this step-by-step. First, you perform a load forecast update, is that correct?

A. That is one of the first steps, yes.

Q. Okay. So updating the load forecast is the first step?

A. One of the first steps.

Q. One of the first steps. Okay. For lay people that may be following the hearing, a load forecast is another name for demand for electricity, is that accurate?

A. Yes. It's a forecast of electricity usage.

Q. Okay. And once the load forecast is updated,

it's reduced by an amount FPL believes that the savings impact of federal appliance and lighting efficiency standards, the savings from those standards will reduce demand, is that correct?

A. Not quite. In our forecasting process, that's an integral part of the forecast. It's not a line item reduction to an already completed forecast. It's integrated into the forecasting process itself.

Q. Okay. But it is accounted for?

A. Yes.

Q. And then the load forecast is further lowered by savings impact of demand-side management, or DSM, which includes incremental energy efficiency that FPL plans to implement in the future, is that correct?

A. Yes, and it's lowered further by incremental load control programs as opposed to energy efficiency that have been approved by this Commission and which we project going forward.

Q. Right. That was my next question. It also includes the cumulative and projected incremental impacts of demand response, is that correct?

A. That's correct.

Q. Okay. Now, the amount of energy efficiency by which demand is reduced is restricted by how much of it passes selected cost-effectiveness tests, is that

correct?

A. I would disagree and explain as follows. In regard to the two types of -- let me term them as two types of energy efficiency pathways for our customers. One of them is the utility programs, energy efficiency programs that we have been directed to do from the last DSM plan docket. In addition, in our forecast we go beyond the years covered by the last DSM plan which ended in -- let's see, 2019, I believe. We extend it out another five or six years at about 100 megawatts a year.

In direct response to your question, that is at least in part determined by the number of programs that pass certain cost-effectiveness tests seen by the State of Florida. The second pathway has nothing to do with cost-effectiveness. These are the impacts of the mandated codes and standards that are integrated into our load forecasts, and that number has grown substantially over the last few years.

To give the Commission an idea as to what we are looking at currently in our forecasting process, for the next ten years we have roughly 300 megawatts of load control projected to be implemented, about 900 megawatts of energy efficiency program. And in the mandated codes and standards we have over 1800 megawatts coming in

that, again, are reflected in our load forecast. So all told we are looking at something on the order of 3,000 megawatts of efficiency and with a small amount of that being load control already projected.

Q. So that was kind of a long way to answer my question in the affirmative?

A. In part in the affirmative. Again, cost-effectiveness is not a factor in regard to the mandated codes and standards which constitute far more than half, approximately 60 to 65 percent of the total energy efficiency that is being projected in our forecasted resource need.

Q. Mandated standards are not utility sponsored, is that correct?

A. That's correct.

Q. They are embedded in your demand forecast, is that correct?

A. I would use the term integrated, but I think it's the same thing.

Q. Integrated. Okay. Very good. And we will get back to this subject in a few minutes.

Now, the energy efficiency and the demand response savings are accounted for as a line item reduction to the load forecast?

A. That's correct.

Q. Okay. So then after you make these adjustments for energy efficiency savings and demand response, the resulting what I believe you called firm load forecast then forms the basis for evaluating competing options to meet the resource need, correct?

A. In part. It forms the basis for calculating when we need resources and how much resources we need. And once that is settled, then we turn our attention to the competing resource options.

Q. Okay. And the timing of those resource needs is the criteria that is used in the current feasibility study, correct?

A. Yes.

Q. Okay. So let's just take a step back for a second. Let's talk about the components of demand-side management that you consider in arriving at this so-called firm load. DSM consists of both megawatt reductions and gigawatt hour reductions, correct?

A. Yes.

Q. Okay. And let's clarify the distinction for lay people. A megawatt hour reduction is a reduction in the amount of energy capacity needed to meet demand at any given time. Do you accept that definition?

A. No. If you will repeat again, I'll try to pick up the distinction here of what I was disagreeing

with.

Q. Sure. A megawatt hour reduction is a reduction in the amount of energy capacity needed to meet demand.

A. No. The word capacity, I believe, is where we disagree.

Q. Okay.

A. I would define megawatt hour reduction as being energy reduced during any hour of the 8,760 hours per year. And a megawatt reduction for terms of resource planning purposes is a reduction on the forecasted peak summer and peak winter hour of the year.

Q. Okay. I'll accept that. And a megawatt hour reduction is typically effectuated by a program that may cycle down air conditioning during summer peak, is that correct?

A. That would be one way to do it, yes.

Q. All right. And that's commonly referred to as demand response?

A. If the utility either directly or indirectly is causing that reduction, either through prices or by pushing a finger on a button, that is generally termed as demand response, yes.

Q. Thank you. And a gigawatt-hour reduction is the reduction in use during any time during the year,

those 8,760 hours that you alluded to, and that's referred to as energy efficiency, is that correct?

A. That is one aspect of energy efficiency programs, yes.

Q. Okay. And examples of energy efficiency measures include, for instance, increased level of attic insulation that helps maintain the temperature inside the home, is that correct?

A. Yes.

Q. Okay. And repairing leaking A/C ducts is an energy efficiency measure, is that correct?

A. Yes.

Q. And replacing an A/C unit with a more efficient one is an example of an energy efficiency measure, is that correct?

A. Yes.

Q. Okay. And, for instance, placing window film on your windows to reduce the amount of heat that enters your house through direct sunlight is an energy efficiency measure, is that correct?

A. Yes.

Q. Okay. And a reflective roof is an example of an energy efficiency measure, right?

A. Yes.

Q. Okay. And these measures we have just

mentioned are intended to reduce energy use and reduce peak demand, is that correct?

A. Generally, yes.

Q. Okay. I want to ask you about -- just a little bit more about your internal resource planning process. Would you characterize the FPL internal resource planning process as the selection of the most cost-effective and economically efficient portfolio resources to meet the demand for electricity services?

A. I would expand it a bit to say that we also take into account other aspects of it, such as fuel diversity, such as reliability aspects, et cetera.

Q. Okay. And if electricity demand could be met more economically with another source, it would be reflected in your feasibility study?

A. Could you give me an example, please?

Q. I cannot at the moment, but if there were.

A. Would you repeat the question, then, please?

Q. Sure. If electricity demand could be met more economically with another resource, it would be reflected in your feasibility study?

A. It would be -- I would say resource options are considered in our resource planning analyses.

Q. Okay. So as we have discussed, DSM programs including energy savings from energy efficiency are used

to reduce demand projections for the purpose of evaluating the natural gas and nuclear option in your feasibility study, correct?

A. I'll ask you to repeat, please.

Q. Sure. DSM program savings, including energy efficiency and demand response, are -- they are used to reduce demand projections, correct?

A. Yes.

Q. They are a line item. Okay. And then they -- so, therefore, they are not used in your feasibility study as a resource option on the second end of your feasibility study? In other words, they don't -- it's not a competing option to meet resource needs?

A. I would disagree. Because we have considered whether or not there are other alternatives, including increased levels of DSM, before we do our feasibility analysis for nuclear. And what we have found, Commissioners, is we do not believe it is reasonable that there is enough cost-effective DSM out there to be a viable alternative to Turkey Point 6 and 7, or for that matter, to the combined cycle with which we are competing head-to-head with Turkey Point 6 and 7.

Q. Now, Doctor Sim, to be clear, you're talking about running these energy efficiency measures through a cost-effectiveness test?

MS. CANO: Excuse me, Mr. Chairman. I'm going to object at this time. We have been going for a while now talking about DSM and energy efficiency measures without a direct link to this witness' prefiled testimony, so I would object to further questions along this line.

CHAIRMAN BRISÉ: Mr. Cavros.

MR. CAVROS: Sure. I would refer FPL counsel and Doctor Sim to Page 17 where he discusses in his testimony the projected DSM, the current DSM and the projected DSM. And I'm trying to lay a foundation so we can address some of this. And he also goes into quite a bit of detail into his internal resource planning process at FPL and how they came to select -- how they came to the point of selecting natural gas and nuclear as competing options to meet resource needs.

And before I can get there, I just need to lay a little bit of foundation, and I'm almost there. So if you can just give me just a little bit of latitude, we will be leaving this inquiry in a minute.

CHAIRMAN BRISÉ: Sure. You can proceed.

MR. CAVROS: Okay. Thank you.

BY MR. CAVROS:

Q. Let me perhaps approach this in a more direct way, Doctor Sim. Energy efficiency measures never

compete head-to-head as a resource with the proposed Turkey Point units; that's correct, isn't it?

A. That's correct. They did compete head-to-head with the combined cycle that we put up in our feasibility analysis as the best and toughest competitor for Turkey Point 6 and 7.

Q. But they never went head-to-head with the proposed Turkey Point nuclear unit in terms of meeting your resource need in 2022/2023?

A. That's correct, and I can explain.

Q. Now, I believe your explanation is going to, you know, go into your -- the goal-setting process and the cost-effectiveness test that you use prior to deciding what is or is not cost-effective in terms of an energy-efficiency measure. And I'm not going there. I'm just, you know, asking a simple question, and that is given your IRP process, unconstrained energy efficiency, unconstrained by any test, by any Total Resource Cost test, any Rate Impact Measure test that was hotly debated during the previous conservation goal setting process.

I'm asking you just a straightforward question, and that is unconstrained energy efficiency was never compared as a competing option to meet resource needs as was natural gas, as was Turkey Point

for the dates of 2022/2023?

A. I would say the answer to that would be yes, but then we don't look at any resource option as being unconstrained.

Q. Okay. Let's go to diversity. If you could turn to Page 17 of your testimony, and if you could go to Line 5. And if you would be kind enough to read the two sentences, the sentence ending at Line 8 out loud for the record, please.

A. This is page -- which page, please?

Q. I'm sorry. This is Page 17, Line 5, starting with FPL's projected.

A. "FPL's projected need for new resources, assuming that the resource need is met by new generating capacity, is presented in Exhibit SRS-5. This projection assumes that FPL is implementing DSM through the year 2019 at a level consistent with the FPSC's 2011 DSM plan order, Order No. PSC-11-0346-PAA-EG."

Q. That's fine. Thank you.

Doctor Sim, what makes you think that the Commission will approve goals that are consistent with the plans that you are implementing now?

A. I'm sorry, repeat the question, please.

Q. Sure. You made an assumption here, and I'm asking you what makes you think the Commission will

approve goals that are consistent with the energy savings of the plans that you are implementing now?

A. I'm making no judgment as to what the Commission will decide as the new DSM goals when we have that docket next year. I'm operating solely on what is approved currently for FPL to implement in regard to DSM. And on top of that, I'm assuming that we go 100 megawatts a year for six years that go beyond the DMS goals period.

Q. Uh-huh. What are your energy efficiency projections in your feasibility study for after 2025, what assumptions do you make?

A. We assume that what is implemented -- excuse me, what is integrated in the load forecast is assumed, and that only. And that's true for the resource plan with Turkey Point 6 and 7 and for the resource plan without Turkey Point 6 and 7. So the efficiency impact is, in effect, washed out for the two resource plans that we are comparing.

MR. CAVROS: Okay. I'm going to ask you to look at a couple of exhibits. I'd like to mark two exhibits right now, and --

CHAIRMAN BRISÉ: Sure. We are at 115 and 116.

MR. CAVROS: Thank you. The first one -- and they are connected with a paper clip. The first one is

an FPL Ten-Year Site Plan Excerpt, and attached to it is FPL 2012 DSM Annual Report Excerpt.

CHAIRMAN BRISÉ: So 115 is the ten-year excerpt?

MR. CAVROS: FPL Ten-Year Site Plan Excerpt, yes. And the other exhibit is FPL 2012 DSM Annual Report Excerpt.

MS. CANO: Pardon me. I don't think the second thing we received is a DSM report excerpt. We have a sensitivity analysis 002.

MR. CAVROS: Okay.

CHAIRMAN BRISÉ: We haven't received anything, as far as the second one.

MR. CAVROS: Okay. We'll fix that.

(Pause.)

MR. CAVROS: I apologize. We handed out the wrong exhibit.

CHAIRMAN BRISÉ: Sure, that happens.

Well, as we are addressing the little mix-up, I think we are hitting on that two-hour mark, and we want to give our court reporter a little break. So we will take, I guess, a five to seven-minute break.

(Recess.)

CHAIRMAN BRISÉ: All right. We are now going to officially reconvene. I know that we were -- right

before our break, we were looking at Exhibits 115 and 116, and I want to make sure that we have the right ones in front of us. And 115 is the FPL Ten-Year Site Plan Excerpt, and 116 is the FPL 2012 DSM Annual Report Excerpt.

Okay.

(Exhibit Numbers 115 and 116 marked for identification.)

MS. CANO: May FPL be heard?

CHAIRMAN BRISÉ: Sure.

MS. CANO: Thank you.

Mr. Chairman, we have spent about an hour discussing the intricacies of DSM and energy efficiency, and we have been answering questions that really go to perhaps future DSM goals proceedings, or even past need determination proceedings. So in light of the fact that these questions are only at best loosely related to the witness' testimony and not directly relevant to any enumerated issue of the remaining issues in this proceeding, we would just ask that counsel could, perhaps, move along and limit his questions to those issues directly at issue in this proceeding. Thank you.

CHAIRMAN BRISÉ: Okay. Thank you.

Mr. Cavros.

MR. CAVROS: Commissioner, the foundation that

I'm laying here goes really to FPL's integrated resource planning process and how that -- and that in itself forms the foundation of the feasibility analysis. So, you know, the witness has testified that, you know, they look for certain attributes when they are going through their resource planning process. And I think that this is, you know, directly relevant in terms of, you know, do they use this as a resource, do they not use it as a resource, does it get -- you know, does it get to compete against nuclear power, or is it just always going to be natural gas and nuclear power going head-to-head as a resource option.

And, you know, before I can do that, I just need to lay down just some foundational facts on the record there. You know, I just think it was the legislative intent to really dig into these things, when they passed the new bill. And, you know, I understand the company's reticence to go into this, but I think it is important, at least for this proceeding, to dig in it just a little bit deeper. I don't have much longer to go with this line of questioning. In fact, maybe another five to seven minutes, and I'm done with this line of questioning. But I think it's important to get it on the record.

I think the legislative intent in SB 1472 was

to apply a higher scrutiny, to really dig into this, and I just don't think it should be glossed over.

CHAIRMAN BRISÉ: Thank you. We recognize that you're trying to lay the foundation for, you know, your line of questioning and your briefs and so forth. We have given you some latitude, and so you say five or seven minutes, and I am going to give you five or seven minutes of latitude, and then we expect for you to continue into other lines of questions.

MR. CAVROS: Thank you. I appreciate that.

CHAIRMAN BRISÉ: Thank you.

BY MR. CAVROS:

Q. Okay. Doctor Sim, good afternoon, again. Before you you have an FPL Ten-Year Site Plan excerpt. If you will turn to that first page, you will see two tables. One table, the table at the top is -- and the column all the way to the right is sales to ultimate customers in gigawatt hours. Do you see that table in that column?

A. Yes.

Q. Okay. At the very bottom, if you go to 2012, you will notice that that figure is 102,226. Is that correct?

A. In Schedule 22.2, yes; 102,226.

Q. Correct. And then there is another Exhibit

Number 116, which is an excerpt from a filing of your 2012 DSM Annual Report, and on the cover sheet there is a table there in the middle of the page. And if you go to the bottom of the first column, it has an actual total achieved gigawatt hour energy, and it has 211.

Do you see that there?

A. Yes.

Q. Okay. And what I would like to determine is how much energy you meet through energy efficiency. How much electricity demand you meet through energy efficiency in 2012. And this can be accomplished by dividing the 211 by the 102,226. And I'd like you to do that, and I understand you have a Master's in mathematics, but I have a calculator here which I'm more than willing to provide to you to come up with that number.

A. I'm sorry, what number are you trying to get? You mentioned energy and you mentioned demand, so what are you asking?

Q. Right. How much demand -- as a percentage of your total sales in 2012, how much of that was met through energy efficiency?

MS. CANO: I object. I really have a hard time seeing how this is relevant to any issue in this proceeding. The amount of DSM as a portion of sales in

2012, I just don't see how that relates to Turkey Point 6 and 7 or its feasibility analysis which comes into commercial operation in 2022 and 2023.

CHAIRMAN BRISÉ: Mr. Cavros.

MR. CAVROS: The witness has already stated that they have made certain assumptions moving forward through 2019 through 2025. So if I can't -- you know, if I'm not allowed to get this calculation, then we can't extrapolate that to the time that these units would be in service. It's a simple calculation. I'm just asking that he calculate that number and provide it to us.

THE WITNESS: If I may clarify? The numbers he's referring to are gigawatt hour numbers that have absolutely no relationship to the timing or the magnitude of our resource need. That is driven solely by megawatts, not by gigawatt hours.

MR. CAVROS: If I may?

CHAIRMAN BRISÉ: Sure.

MR. CAVROS: The witness has testified that energy efficiency programs reduce peak load. They have a capacity value for reducing peak load, so they do reduce megawatts. And so, you know, I fundamentally disagree with the witness, and I think this is instructive for the Commission to know, you know, how

much of this resource are they actually deploying to meet electricity demand as it relates to their planning process and as it relates to the feasibility study.

CHAIRMAN BRISÉ: I will do this. I will do this; I will allow the witness to answer your question, but allow him to put it in the context of how they would do the calculations. Does that make sense to you?

MR. CAVROS: Yes.

CHAIRMAN BRISÉ: Okay.

BY MR. CAVROS:

Q. Doctor Sim, I have asked you to divide 211 gigawatt hours by 102,226 gigawatt hours. If you can do that in your head, that's great, otherwise I do have a calculator here which I can offer to you.

A. Ballpark it's about, subject to check, .2 percent, which means absolutely nothing in regard to our need for capacity. The need for capacity, both the timing and the magnitude, is driven solely by the megawatts, not by gigawatt hours.

Q. Okay. And that is two-tenths of one percent, is that correct, roughly?

A. Yes. Roughly, subject to check.

Q. That's what I got using a calculator; that's very impressive. So the benefits of energy efficiency include -- in fact, energy efficiency does not produce

any CO2 emissions, is that correct?

A. By itself, no. But by deferring the need for future capacity it can increase a number of system emissions, because the system will be less efficient than it would be if, for example, a highly efficient combined cycle unit would have been built instead.

Q. Okay. And it produces no nitrogen oxide emissions, is that correct?

A. By itself, no. But the net impact may be an increase in NOx. The same for SOx.

Q. And by itself it produces no CO2 emissions, is that correct?

A. By itself, no.

Q. Okay. And it also serves as a hedge against fossil fuel price volatility, correct?

A. Perhaps; perhaps not. Because is there a fuel penalty associated with DSM avoiding or deferring a fuel efficient unit, the system is not as efficient in total when that unit is deferred. So it is a call that could go either way, depending upon the DSM measure and the type of avoided generating unit.

Q. Okay. I'm not going to belabor this point, because the Chairman wants us to move on, but -- so let me just understand this correctly. You meet current demand with about 67 percent of natural gas-powered

plants, right?

A. With energy delivered by burning natural gas.

Q. I'm sorry, yes, correct. And then you meet about 20 percent of demand through nuclear-powered plants, is that correct?

A. Ballpark, yes.

Q. Okay. And then you meet about two-tenths of one percent of demand through energy efficiency, right?

A. No, because the energy efficiency that has been implemented since we began DSM programs, it's probably almost 30 years now, is already baked into our load forecast. So that energy efficiency is not explicitly accounted for in these tables you have shown me, but it is buried in those load forecasts.

Q. Sure. But in 2012 your incremental energy efficiency was two-tenths of one percent, correct?

A. For that one year only.

Q. Yes. Thank you. It certainly doesn't look like the company values it as a resource for diversification, right?

A. We value DSM resources, those that are cost-effective, and, in fact, we are spending in excess of $200 million a year for that resource because we value it and because we believe it can be cost-effective, and we have been doing this for

30 years.

Q. By the way, energy efficiency is the resource that FPL's shareholders do not earn a rate of return on, is that correct?

A. For the most part, yes. There are exceptions.

Q. Okay. I want to move on now.

Doctor Sim, you did not have a lot of quantitative -- I'm making a judgment, and I'll step back from that. I want to speak to you about some of the qualitative impacts or feasibility issues related to the plant. One of them is cross-subsidization, and I wanted to ask you if you considered cross-subsidization in the utility context as a feasibility, as a qualitative feasibility issue in your study?

A. Could you provide an example, please.

Q. Yes, sure. I'll give you an example of myself. I moved to Florida in 1994. These plants are being built, presumably, in the 2022/2023 time frame. I'm paying for them now. They are projected to meet demand in the future. I am technically -- well, I don't need the power. I'm doing fine just now, yet I'm subsidizing them for future customers. Did you consider that aspect of cross-subsidization as a qualitative consideration in your feasibility study?

MS. CANO: Could counsel point us to what

issue in this docket this question relates to?

MR. CAVROS: If the witness has an opinion he is free to share it. It is a qualitative -- it could be a qualitative feasibility issue. I'm throwing it out there. If he has an opinion, he is free to share it. If not, I can move on.

CHAIRMAN BRISÉ: All right. I guess I'll state this for future reference, as well. My preference for cross-examination is cite the page, cite the line, ask the question, or clarification, and we go from there. Okay. That's generally my preference.

MR. CAVROS: Fair enough, Commissioner.

What I'd like to do is mark another exhibit. And this is called consumer -- or, rather, customer economic benefit crossover timeline. And I believe this would be Exhibit 117.

CHAIRMAN BRISÉ: Yes, it would be.

(Exhibit Number 117 marked for identification.)

CHAIRMAN BRISÉ: So the short title would be Customer Economic Benefit Crossover Timeline?

MR. CAVROS: Yes, Chairman.

CHAIRMAN BRISÉ: Okay.

MR. CAVROS: Doctor Sim, when you're ready I will --

THE WITNESS: Ready.

BY MR. CAVROS:

Q. Okay. Now, this graph is a response by FPL to a staff interrogatory request. It shows a timeline of when the economic benefit to customers of lower fuel costs exceeds the costs incurred from building the plant if the plant is placed in service in 2022/2023, correct?

A. It is part of our response to this interrogatory.

Q. Okay. There has been numerous references both in Witness Scroggs' testimony and your testimony about the fuel-saving benefits of the plant, and I want to put the -- I want to put the benefits into a temporal perspective.

The timeline starts at 2013. The crossover point under a high natural gas/high CO2 scenario doesn't occur until 2038 or so, is that correct?

A. It's half right, half incorrect. If you look at the cumulative nominal crossover, it is out in 2038. If you look at what year customers begin to receive lower bills due to the benefits of the program or the project, it comes in in 2028.

Q. Uh-huh. But I'm looking at net benefit. In other words, when the fuel cost savings start exceeding the costs that have been incurred by building the plant.

A. And that year would be 2028. That's the first year in which customers begin to receive benefits.

Q. That's not indicated on this graph.

A. Because it is cumulative on the graph. The annual value show it crosses in 2028. My view, Commissioners, is that each year the amount of money that customers have paid, whether it's positive or negative, is gone as you move past that year. And you look at the next year, do customers begin to benefit in the next year from the costs that will be incurred and the benefits that will be realized. And on that basis, the first year in which customers receive a benefit, that year is 2028 and every year thereafter through 2063.

This graph looks only at cumulative. It says let's go back to 2013 and let's look at all the costs that have been incurred and all the benefits that have been received, and let's ignore the fact that those years will be past us. And if you account for all of them, then in 2038, customers will see a net cumulative benefit.

There are two different ways to look at it. In my opinion, the more important one is how long does it take before customers begin to receive benefits, and that year would be 2028.

Q. Let's consider the net cumulative benefit scenario --

A. I thought you would.

Q. -- for a moment. Then the crossover point, if we consider the high natural gas/high CO2 scenario, doesn't occur until 2038, so that's 25 years from today, is that correct?

A. That's correct.

Q. Okay. And under a low natural gas/low CO2 scenario it doesn't occur until approximately 2049 according to this graph, is that correct?

A. That's correct. I will point out that the numbers you are looking at are looking at, again, half of our answer where we are assuming the highest end of the nonbinding capital cost range.

Q. Right, I understand that.

Now, if we use the 2038 crossover date, I'm going to provide you an example. If I'm a 60-year-old customer, FPL customer today, I won't see a net cumulative benefit until I'm 85 years old, right?

A. Assuming that the math is correct, yes. But it's no different than with any other resource option, be it DSM, be it nuclear, be it combined cycle. There is almost always a crossover period. And if customers pass away, move out of the state, move out of the

service territory, et cetera, the same situation holds.

Q. Okay. And, likewise, if we used the 2049 crossover date, I won't start seeing a net savings as a 60-year-old FPL customer today until I'm 96 years old?

A. If you are one that would look at cumulative, yes. If you are one that looks at when you would begin receiving benefits, it would be considerably fewer years.

Q. Okay. And if -- bear with me for a second, and then we'll move on. If we used, again, the 2038 crossover date, if I'm 70 years old today as an FPL customer, I won't see a net savings until I'm 95, is that correct?

A. That would be correct. Similar to a number of DSM programs that take a very long time in which to crossover cumulatively.

Q. And, lastly, if we used the 2049 crossover date, and I'm a 70-year-old FPL customer, I won't start seeing a net cumulative benefit until I'm 106 years old, is that right?

A. That's the math, yes.

Q. Okay. I want to talk a little bit more just about some of the assumptions that were used in the feasibility analysis. If there's a drop in demand, would it necessarily push back the in-service dates of

the units, all things being equal?

A. Repeat the question, please.

Q. Sure. If there was a drop in demand, would it necessarily push back the in-service dates of the units, all other things being equal?

A. It could.

Q. Okay. And I guess the flip side of that question is that if your demand projections are inflated, you could be planning for a resource that isn't needed as soon as you think it is, correct?

A. I disagree with the premise of the question that our load forecast is inflated.

Q. If.

A. Well, I disagree with the premise.

Q. Okay. Well, you can disagree with the premise, but if your demand projections were overestimating, you could be planning for a resource that isn't needed as soon as you think. Is that fair to say?

MS. CANO: Asked and answered.

MR. CAVROS: Actually --

CHAIRMAN BRISÉ: No, I don't think he answered the question. I think he asked for it to be restated.

THE WITNESS: Let me attempt to restate.

If our load forecast becomes lower than what

is currently projected, our resource need would be pushed out, all else equal.

MR. CAVROS: Okay. And I would just like to mark another exhibit.

CHAIRMAN BRISÉ: Sure. We are at 118.

(Exhibit Number 118 marked for identification.)

MR. CAVROS: And I don't have a cover page. This is the review of the ten-year site plan excerpt. That was a mistake. Can I switch with you? I just have the title. Thanks. And this is entitled PSC Review of the 2012 Ten-Year Site Plans, Excerpt.

CHAIRMAN BRISÉ: Okay. Thank you.

BY MR. CAVROS:

Q. All right. Doctor Sim, if you're ready?

A. I'm ready.

Q. Okay; great. This document -- if you look at the table in the middle of it, and the text above it, and I'll go ahead and read the text to put some context to the table.

Table 5 below illustrates the historical forecast error for 2012 and 2011 on an average error and average absolute error basis. The calculated average error is positive for all ten-year site plan utilities. This shows a tendency to over-forecast with the

resulting average forecast error for all ten-year site plans combined at 11.38 percent in 2012.

And if you look down at the first row, and follow that row across, it shows an average over-estimation by the company from 2007 to 2011 of roughly -- well, it's 12.12 percent; is that right?

A. For net energy for load, that's correct.

Q. Okay.

A. And, again, I'll state net energy for load has nothing to do with the projection of resource needs or the magnitude of resources. What's important are megawatts, not gigawatt hours net energy for load.

Q. Okay. That's all I have for that exhibit.

What capacity factor did you use for the proposed reactors in the feasibility analysis?

A. I believe we used an availability of approximately 95 percent that varied from year-to-year in regard to the timing of the refueling.

Q. Okay. As a capacity factor -- a 90 percent capacity factor would necessarily lower the economic benefit of the plant, is that correct?

A. Compared to?

Q. Compared to 95 percent.

A. Right. But we did not, our models did not predict that it would be 95 percent every year. In

certain years where we had no refueling, it would operate at full availability, which would approach 95 percent. In other years it would approach 90 percent simply because we had to take the unit out for scheduled refuelings.

Q. Okay. So maybe I asked the wrong question. What is your average capacity factor over the life of the unit?

A. I believe we didn't calculate an average, but we showed the annual projection for both Turkey 6 and Turkey 7 in our response to one of staff's interrogatories. So we project it for every year the same way it was dictated in our model.

Q. Okay. I'm not a nuclear engineer, but you are not going to run a new unit that's a new design at 90 percent capacity for the first few years, are you?

A. I'm not a nuclear engineer either, so I can't respond from that perspective.

Q. Fair enough. What useful life is used for the natural gas units used in the feasibility study?

A. In the feasibility study we assumed a book life of 30 years, but we assumed that they kept operating throughout the analysis period. So, in essence, they were running the same life as the nuclear units, 40 years.

Q Okay; great. And could you turn to Page 29 of your testimony, please. And specifically on Line 4, you state that you project approximately a present value of almost a billion dollars in savings for not having to construct transmission lines to import power into the southern region by building Turkey Point 6 and 7. Did I state that accurately?

A. That's correct.

Q. Okay. Would those same savings apply to the natural gas units in your feasibility study?

A. No, because the natural gas unit was not assumed to be sited at the Turkey Point site. We looked at that possibility and what we saw was the price of getting firm natural gas to the Turkey Point site was far in excess of this 939 million CPVRR. Therefore, if we were going to build a combined cycle, it would be cheaper to build it elsewhere outside of Miami-Dade/Broward and incur the cost for this transmission.

Q. It would be cheaper given the fact that it would save almost a billion dollars in net present value and transmission line --

A. Let me try to put it in installed cost basis. This 933 million CPVRR equates to roughly 650 million in installed cost for building the transmission lines. The

combined cycle on the other hand, the last cost I got for bringing a pipeline all the way through populated Broward and Miami-Dade to the Turkey Point site, installed cost was 1.2 billion, almost double. Therefore, if we were going to build a combined cycle, the least expensive option would be to build it outside of Miami-Dade/Broward. Excuse me, outside of the Turkey Point site for sure.

Q. That would have costs associated with it, as well, wouldn't it, building it outside of Broward?

A. It would. But it would have less cost than if we were to build it down at the Turkey Point site.

In other words, Commissioners, we put the Turkey Point 6 and 7 up against the most cost-effective arrangement for a combined cycle we had at the time.

Q. And that billion dollars, almost billion dollars in net present value savings helps to make the project as it goes up against a natural gas plant. It tends to weight it more favorably?

A. Yes. Anything that increases the benefits of a project is favorable for that project.

Q. Okay. If you'd be kind enough to turn to Exhibit SRS-3 for me. And we are getting close to the end here. And you've got environmental compliance cost tables, and I want to talk about environmental

compliance costs for a second. There are laws that regulate SO2 emissions, correct?

A. Yes.

Q. Okay. And there are laws that regulate nitrogen oxide emissions, correct?

A. Yes.

Q. And those laws permit the trading of pollution credits so that there is kind of a discernable price for compliance to those laws, is that correct?

A. Yes.

Q. Okay. And there are no laws that create compliance costs for CO2 currently, correct?

A. Not federal, and not in the State of Florida. However, there are, for example, in the State of California.

Q. This proposed project is being planned to be sited in Florida, correct?

A. Yes.

Q. Okay. For there to be a cost on carbon, it would have to be, perhaps, a carbon tax or a market-driven cost through a cap and trade policy, is that your understanding?

A. There are many varieties that it could take.

Q. Uh-huh. And that would have to be legislatively implemented, correct?

A. That's correct.

Q. Okay. And that would have to be either at the state level or the federal level, is that right?

A. Yes. And at the time we were putting the feasibility analysis together, for example, we saw activity at the federal government level in terms of a proposed carbon tax bill by Senator Boxer and Senator Sanders, we saw a discussion draft document by Representative Waxman and Senator Whitehouse also calling for a carbon tax. So with proposals such as that, we stuck with the proposal we had used in 2012 for a CO2 allowance cost, or compliance cost, let's put it that way.

Q. So these compliance costs without any existing costs or any legislation in place, this is essentially a political guessing game, is that correct?

A. I would say I could agree with that statement, although I would think it is, with President Obama's memorandum to the EPA urging action on CO2 and giving explicit timetables between now and 2016, I would say it is probably more likely that we are going to see nonzero CO2 costs than at this time last year for sure.

Q. Doctor Sim, you just testified that there would have -- CO2 costs would have to be legislatively implemented, correct?

A. No, I don't believe I testified to that. I believe I mentioned that there were legislative proposals, but I also mentioned that President Obama has ordered the EPA to act in terms of -- I believe the terminology was standards, regulations, or guidelines for CO2 costs or -- lowering CO2 for both existing units as well as for new units, with hard timelines for that to be accomplished.

Q. But, Doctor Sim, it's important to distinguish between what EPA rules might come out and actual compliance costs. Are you familiar with the Clean Air Act, roughly?

A. Roughly.

Q. Okay. Are you familiar that there is no section in the Clean Air Act that gives the agency authority to issue a carbon tax or develop a cap and trade program?

A. I don't think I'm qualified to respond to that question, sir.

Q. Okay. Do you have an opinion as to whether the Republican majority in the House of Representatives will ever approve a carbon tax?

A. I have no opinion on that.

Q. Uh-huh. These costs essentially are speculative, aren't they, Doctor Sim?

A. I'd say they are forecasts, and we deal with forecasts for all costs, both for costs for the units, fuel costs, et cetera.

Q. And were you here earlier for Doctor -- rather, Witness Scroggs' testimony?

A. For the bulk of it, yes.

Q. Okay. And we looked at a Concentric exhibit where Concentric Energy advisors pegged the overnight costs of the Turkey Point plant per installed kilowatt at $5,320. Do you recall that?

A. Yes.

MR. CAVROS: Okay. What I'd like to do, and this is my last exhibit, is mark another exhibit.

CHAIRMAN BRISÉ: 119.

(Exhibit Number 119 marked for identification.)

MR. CAVROS: Let me find it. And this exhibit is entitled Sensitivity Analysis with a Zero CO2 Compliance Cost.

CHAIRMAN BRISÉ: Thank you.

BY MR. CAVROS:

Q. Doctor Sim, this is a response by Florida Power and Light to a staff interrogatory. It's a sensitivity analysis assuming zero compliance costs. And if you look at the far column, Column 6, and you

scroll down, those numbers are numbers -- well, those numbers essentially reflect different scenarios, high fuel costs, medium fuel costs, and low fuel costs and different environmental scenarios. But the one constant is that there is no CO2 compliance cost, is that correct?

A. That's correct.

Q. Okay. Now, using the overnight 5,320 installed kilowatt price estimate, doesn't Column 6 show that the plant is not cost-effective under any fuel scenario?

A. It shows that given the assumptions in this one sensitivity analysis, that is the outcome. However, as noted at the bottom, just changing one of the assumptions, such as going from a 40-year life which we think is highly conservative and which we have used in Turkey Point 6 and 7 to a 60-year operating life, would change this dramatically. I think in that case you'd have six out of the seven, at least, being cost-effective even with no CO2.

And I would remind the Commission that these break-even costs change from year-by-year, from one feasibility analysis to another, and I would fully expect them to change next year.

Q Okay. And, lastly, Doctor Sim, would you say

that the project is, quote, still economically feasible at this time?

A. Yes; definitely.

Q. Uh-huh. And would you know if that was what Witness Fallon's exact statement in his testimony for Duke in this year's docket before they canceled their reactor project last week?

A. I cannot comment. I have not read his testimony, but I will point out that what's true for one utility system isn't necessarily true for another utility system. Our system is quite a bit different than Progress Energy Florida, excuse me, Duke Florida, and, therefore, I would not expect the results of our feasibility analysis to match theirs.

MR. CAVROS: Thank you, Doctor Sim. I have no further questions.

CHAIRMAN BRISÉ: Thank you.

Staff.

MR. YOUNG: Yes.

CROSS EXAMINATION

BY MR. YOUNG:

Q. Good evening, Doctor Sim.

In your prefiled testimony you discussed the use of the break-even methodology to determine cost-effectiveness of the resource plan with Turkey

Point 6 and 7 as compared to a resource plan without Turkey Point 6 and 7, correct?

A. Yes, sir.

Q. Can you briefly explain the process for performing the break-even analysis for comparison of the resource plan with Turkey Point 6 and 7 projects and the resource plan without Turkey Point 6 and 7 project?

A. Yes. Essentially, we're comparing two resource plans, one with Turkey Point 6 and 7, but assuming zero capital cost, but all other costs for the unit such as fixed O&M, fuel costs, et cetera, versus a competing resource plan in which we have taken out Turkey 6 and 7 and we have put in two combined cycle units similar to those that we are building with our modernization projects.

We then compare the CPVRR costs for each fuel and environmental cost scenario. We see in all cases that there is a significantly lower CPVRR cost for the resource plan with Turkey 6 and 7, as to be expected assuming zero capital cost, and we worked backwards to find out what the break-even cost is for that particular scenario of fuel and environmental costs, and then we compare it to the high end of the nonbinding cost estimate range.

Q. So can you explain to the Commission why this

methodology you chose was chosen and why you considered it a reasonable approach?

A. Yes. We have used this since our need filing back in 2007. And we chose this approach because at the time, and still today, there is uncertainty regarding what the actual capital cost will be for a new nuclear unit. And I believe as we explained in response to one of the staff interrogatories, our approach may change once we get to a point where we have a license in hand, we have engineering studies and contracts in hand, and we have a more definitive projection of what the costs will actually be.

Q. Can you briefly explain what are decommissioning costs?

A. I'm sorry?

Q. What are decommissioning costs, and what's included in decommissioning costs?

A. I'm sorry, I can't explain that with any great specificity, decommissioning costs. I don't deal with that.

Q. In your analysis, was decommissioning costs included?

A. I would have to check whether they were implicit in the nonbinding cost estimate range.

Q. Okay. In your analysis of the feasibility of

completing the Turkey Point 6 and 7 project, did you give consideration to renewable forms of generation as an alternative?

A. Yes. As we responded in response to an interrogatory by staff, we did consider a number of renewable energy resources. However, what we're looking at is is this -- whatever renewable energy resource we are looking at, is it a viable alternative to 2,200 megawatts of firm capacity.

Wind in this state is not a firm capacity option; solar in this state is not a firm capacity option, which cuts them out at that point. Biomass can be a firm capacity option and we considered it. However, all of the projections we have say that there is nowhere near 2,200 megawatts of unused biomass potential in this state.

Q. Are you familiar with the term sunk costs?

A. Yes, sir.

Q. What are sunk costs?

A. Sunk costs are costs that are already incurred and behind you and which do not affect the decision looking forward in order to complete a project.

Q. In your analysis of the economic feasibility of completing the Turkey Point 6 and 7 project, in your Prefiled Direct Testimony on Page 12 beginning on Line

5, you explain that -- you explain that sunk costs are not considered in your analysis of whether to continue or complete the project, is that correct?

A. Yes, sir.

Q. Focusing on the fuel diversity, can I please have you turn to look at the FPL Ten-Year Site Plan, 2013 to 2022, Page 100. And that's -- for purposes, we have made an extra copy for you and for the Commissioners.

MR. YOUNG: And, Commissioners, that's Hearing Exhibit Number 79.

BY MR. YOUNG:

Q. Do you have it?

A. Yes, sir.

Q. All right. Looking at Page 99 and Page 100 that was just handed to you, the page shows where a percentage of each fuel type contributes to FPL's generation, right, energy generation?

A. Yes, sir.

Q. Is it accurate to say that these percentages are calculated by dividing the gigawatt hours of the energy produced with each fuel by the total net energy for load shown on Page 99?

A. Yes, sir.

Q. On Page 99, the gigawatt hours produced by

coal is projected to increase from 4,884 in 2013 to 7,066 in 2022, correct?

A. Yes.

Q. How does FPL account for the nearly 2200 gigawatt hour increase?

A. Strictly economics on fuel costs. What we have seen currently is very low natural gas costs that are making it uneconomical for certain coal units to run during certain periods. However, natural gas costs are expected to rise and to rise a bit more quickly than does coal. At a certain point there will be a crossover, and coal will then be more economical to utilize and it will be utilized.

Q. All right. Looking at Page 100, at Schedule 6.2, Line 10. This shows the generation from natural gas increasing from 61.1 percent this year to 67.1 percent in 2021, correct?

A. Yes.

Q. And in 2022, Turkey Point is added, which reduced the projected natural gas percentage to 63.2 percent of that year, correct?

A. Yes, sir.

Q. Would you expect the percentage of generation from natural gas to go even lower with the addition of Turkey Point 7 in 2023?

A. Yes. In 2023 -- well, let me back up, if I may. In 2022 we're seeing the impact of Turkey Point 6 for roughly seven months of the year only, because it has an in-service date of June of 2022. So in 2023 we will see a full 12 months from Turkey Point 6 and about seven months worth of contribution from Turkey Point 7. So we will see the nuclear -- excuse me, the natural gas percentage drop below the 63.2.

Q. And, conversely, what will happen between 2021 and 2023 to the percentage of generation fueled by natural gas by using the resource plan without the new nuclear plants?

A. As indicated in my testimony, we would see by 2023/2024 it would increase substantially to approximately 71 percent.

MR. YOUNG: Okay. Can I have a second, Mr. Chairman?

CHAIRMAN BRISÉ: Sure.

MR. YOUNG: No further questions.

CHAIRMAN BRISÉ: All right. Thank you very much.

Commissioners?

Commissioner Balbis.

COMMISSIONER BALBIS: Thank you, Mr. Chairman.

I have a few questions for Doctor Sim.

And I'd like for you to go into a little bit more detail on the alternative resource plan, and specifically the PM area model. Could you go into a little bit of detail as to what factors are considered when putting up the Turkey Point 6 and 7 against a combined cycle and/or determining operational costs?

THE WITNESS: Yes, sir. We first create two resource plans, and the resource plans are identical up to 2022. Then in '22 they begin to diverge. We put in Turkey 6 and Turkey 7 in the one plan in 2022 and 2023. In the alternate plan we put up one combined cycle in 2022 and the second combined cycle in 2024.

From that point on the resource plans add incremental combined cycle capacity. They differ slightly year-by-year, but essentially the same amount of combined cycle is then added in each resource plan through the analysis period.

We then run those resource plans through our Primavera model to get production costs, which are fuel costs, variable O&M costs, emission projections which lead to emission costs. And in addition, all of the fixed costs are then capped for both resource plans, are then calculated on what we call a fixed cost spreadsheet. So we capture certain things such as the

capital cost of the generating units. Let's take the case of the resource plan with the combined cycle; it will be the capital costs to the combined cycle, the firm gas transportation costs, the fixed O&M, the capital replacement, all of that for each unit as it enters our system.

COMMISSIONER BALBIS: Okay. And then in determining the break-even costs, you consider then the capital costs, the operational costs, maintenance, fuel, and any potential carbon taxes?

THE WITNESS: Yes.

COMMISSIONER BALBIS: Okay. And you compare that head-to-head against a combined cycle?

THE WITNESS: Well, let me be clear, Commissioner. For the resource plan with Turkey Point 6 and 7, we are assuming zero capital costs. We have fixed O&M costs, we have fuel costs, et cetera, but we have zeroed out one thing, and that is the capital cost. And then we look at the CPVRR stream of that resource plan versus the, as expected, higher CPVRR cost of the alternate resource plan, and we work backwards. What could that capital cost be for that fuel and environmental scenario to have the CPVRR of both resource plans identical.

COMMISSIONER BALBIS: Which is how you put

back in the capital cost --

THE WITNESS: Yes, sir.

COMMISSIONER BALBIS: -- so that you do account for it.

THE WITNESS: We work backwards to find out what it would take to reach a break-even point.

COMMISSIONER BALBIS: Okay. And the results of that are listed in your Exhibit 8, which lists that in five of the seven scenarios, it is still cost-effective.

THE WITNESS: Yes. That the break-even cost is projected to be higher than the highest end of our nonbinding capital cost range.

COMMISSIONER BALBIS: Okay. And you provided rebuttal testimony to Witness Jacobs, but it primarily dealt with the EPU projects, correct?

THE WITNESS: That's correct.

COMMISSIONER BALBIS: And he did not provide any testimony contradicting the break-even analysis or the comparison of the natural gas versus Turkey Point 6 and 7 scenarios?

THE WITNESS: That's correct. His testimony did not address Turkey Point 6 or 7.

COMMISSIONER BALBIS: And the reason why I'm asking is there has been a lot of attention placed

recently on comparing new nuclear units against combined cycle plants, and I just wanted to clarify that FPL did go through that exercise in performing this analysis in your testimony.

THE WITNESS: Yes. For Turkey Point 6 and 7, we compared the two resource plans, which was essentially a heads up of two nuclear units versus two combined cycles under seven different scenarios of fuel and environmental costs.

COMMISSIONER BALBIS: Okay. And when I indicate attention, I'm sure you're aware of recent newspaper articles, et cetera, that compared the Levy Units against combined cycle, which I know you are not familiar with their testimony, but we even received correspondence from members of the Legislature, you know, requesting us to go through the analysis that, according to your testimony, FPL has gone through, and none of the intervenors have provided any alternative testimony contradicting your results. So I just wanted to point that out in an effort of transparency.

THE WITNESS: Commissioner, would it help if I were to give you an opinion as to that newspaper article?

COMMISSIONER BALBIS: By all means.

THE WITNESS: Okay. First of all, let me

preface this by saying that the newspaper article only gave bits and pieces of the assumptions that were to be made in the analysis. And I have not seen the analysis, but from the information they gave me, I think the analysis was seriously flawed on several points.

First of all, the approach of the analysis was not a benefit/cost analysis as our analyses are, looking at both benefits and costs. The analysis that was described in the newspaper article was solely a cost analysis: What does it cost to build and operate nuclear units versus building and operating combined cycles. The benefits of each were never considered.

Second of all, the approach that was used looked at a combined cycle unit in which 90 percent of the carbon emissions were captured, and they assumed that the remaining 10 percent was subject to a carbon tax.

Well, curiously missing from the newspaper article was any mention of what they did with the carbon that they captured. There was no discussion of carbon sequestration. Therefore, one of two things would have to happen. They would have to have then applied what would have been a significant cost to then sequester all this carbon they've captured, or they would have to just release this carbon they captured back to the atmosphere

and incur the carbon tax on the 90 percent of the emissions that they captured.

Third, in looking at it they said the combined cycle unit has 90 percent carbon capture, and yet they said the unit would run at an 81 percent capacity factor. In looking at a particular DOE website, the current version of it, they have a very easy to look at table where you go in and you toggle a switch and you push a button; combined cycle with carbon capture, combined cycle without carbon capture. And interestingly enough it is a 90 percent carbon capture is the assumption.

Now, what that DOE website says is that certain things happen to the combined cycle. First of all, the capital costs of the unit more than doubles. It went from roughly $714 a kW to almost $1500 a kW. I did not see that reflected in the article.

Second of all, the heat rate is dramatically increased from about 6,800 Btus per kilowatt hour to almost 8,000 Btus a kilowatt hour. Now, I can't answer for the Duke system, but on our system by the year 2021, something with an 8,000 heat rate is going to be competing with a system average heat rate on our system of under 7,000. So that combined cycle would operate at about 20 percent capacity factor, far from the

81 percent they assumed, and even further still from the 90 percent that are being assumed and we're seeing in our analyses for the nuclear units.

And that points out one of the flaws in their analysis. If they are looking only at the cost of the combined cycle unit, an 81 percent capacity factor going down to 20 percent, which it would on our system, would dramatically decrease the cost of the fuel, therefore further lowering the cost used in the article and in the analysis for combined cycle, which shows the fallacy of trying to look at costs only.

Third of all, another impact would be that the actual capacity of the combined cycle would dramatically drop. Their combined cycle dropped from 555 megawatts down to 474, so about a 15 percent drop in megawatts. So all told, there were a number of assumptions that we believe to be reasonably accurate in the DOE website that don't appear to be included in that Tampa Bay Times article.

Therefore, for example, the article said we presume that both the combined cycle and the nuclear unit would produce roughly the same amount of energy over the course of a year. Well, if it's only operating at 20 percent, you're going to need 4-1/2 times as much combined cycle capacity built in order to equal the

output of a nuclear unit.

So, Commissioner, there are a number of problems that appear in that article in the assumptions that were made in the analysis.

COMMISSIONER BALBIS: But other than that, it was accurate?

(Audience laughter.)

THE WITNESS: Other than that, it was right on the button.

COMMISSIONER BALBIS: Okay. Thank you. I appreciate that.

And I do have a final question or two concerning your SRS-1, and also in the chart that is behind you, you indicate that the projected fuel savings is $78 billion over the life of the project, correct?

THE WITNESS: Yes, sir.

COMMISSIONER BALBIS: In last year's proceeding, that was listed at $58 billion, and yet in SRS-2 you decrease the natural gas price. Can you explain that discrepancy, why the savings went up by --

THE WITNESS: Yes, sir. If I may turn to SRS-2, the natural gas costs at the top of the page. What we see is through the year 2035 we're seeing lower natural gas costs than what we were having forecast last year. But somewhere between 2035 and 2040 it crosses

over, and we're seeing higher natural gas cost forecasts than what were forecast last year.

And just as a reminder from -- well, even 2040, we go out to 2063 in our analysis, so there is almost 25 years of higher natural gas costs than what were forecast last year. So that accounts for the difference between last year's -- I forget, 58 or 59 billion in nominal savings, and the 78 billion this year.

If we had gone back one more year, I think the projection was on the order of 75 billion nominal. So we are roughly back to where we were two years ago.

COMMISSIONER BALBIS: Okay. And then the last question is more of a hypothetical. If your testimony indicates that customers will save $78 billion in fuel over the life of the project, and if FPL decided to just cancel the project on its own volition or for another reason without any of the conditions changing, then obviously the customers would not realize any of those benefits?

THE WITNESS: That's correct. And they would not realize not only those fuel benefits, but benefits in terms of increased reliability, increased fuel diversity, et cetera.

COMMISSIONER BALBIS: Okay. Thank you.

That's all I had.

CHAIRMAN BRISÉ: Thank you, Commissioner Balbis.

Commissioner Graham.

COMMISSIONER GRAHAM: Thank you, Mr. Chairman.

Doctor Sim, at the beginning of the questions from SACE, you were asked a question about the nuclear costs, and I believe there was a kilowatt hour price of 15 cents, and you had made a comment that that was more of a -- that was a gross look at it, that's not the net cost. And you said that doesn't take into account the environmental savings and some other savings, but you really didn't get into the details. Can you speak a little more about what savings was not involved in that 15 cents?

THE WITNESS: Yes, sir. Essentially, no benefits are incorporated in the 15 cents. Staff asked in an Interrogatory Number 41 -- let me see if that is the right one. I'm sorry, it's not the right one. Perhaps staff can assist me. You had asked for levelized cost in one of your interrogatories.

I found it. It's Number 63. Excuse me for the delay.

In this interrogatory, staff asked for levelized cost in dollars per kilowatt hour for a number

of resource options, including Turkey 6 and 7, combined cycle, wind, biomass, and rooftop PV. We supplied that. And what's included in that calculation is what is typically included in a levelized cost calculation, which is simply include the cost of building the unit and include the cost of running the unit. Again, as if that unit were out in a field somewhere and were completely unconnected to the utility system.

But the problem there is all of these resource options are connected to a utility system and impact the dispatch of all the other units on the system. So when you go in and you look at a levelized cost calculation, you pick up none of those benefits.

Now, we did the calculation as a typical levelized cost calculation is done for Turkey 6 and 7, and we came out with 15.8 cents per kilowatt hour. But then in our interrogatory response we also provided a levelized cost calculation in which we took out of our more complete analysis just a few of the benefits, meaning what are the fuel savings on the rest of the system from operating a nuclear unit at low fuel cost at 90-plus percent capacity factor, what are the environmental cost savings, and the third of the three we chose was these regional transmission cost savings.

And what we came out with there was if you

just account for a few of the benefits unaccounted for in a typical levelized cost calculation, it came out to 3.8 cents a kilowatt hour. And, again, that doesn't account for the benefits of capacity deferral, for obviating the need for firm gas transportation, it doesn't account, obviously, for fuel diversity, any of those.

But I think the message is a levelized cost calculation, regardless of the type of resource option, is just a lousy way to look at the economics of resource options, because it's very incomplete and gives you misleading information because it completely avoids any of the benefit side of the calculation.

COMMISSIONER GRAHAM: So what you're saying is our staff asked a lousy question?

THE WITNESS: I think they asked a question that --

COMMISSIONER GRAHAM: You don't have to answer that.

THE WITNESS: I won't, then.

COMMISSIONER GRAHAM: Thank you.

THE WITNESS: Yes, sir.

CHAIRMAN BRISÉ: Any further questions from Commissioners?

Okay. Seeing none, redirect.

MS. CANO: Thank you. Briefly.

REDIRECT EXAMINATION

BY MS. CANO:

Q. Doctor Sim, Mr. Cavros asked you some questions about what was marked as Exhibit 117, and that is the projected cumulative benefits of Turkey Point 6 and 7 over the life of the analysis?

A. Yes.

Q. And he specifically gave you some examples of when certain customers of a certain age on FPL's system, for example, a 60-year-old might see the cumulative benefits from this project, pointing out that it would be later in life. Do you recall that line?

A. Yes.

Q. Okay. Are the customers on FPL's system today of all ages, including people who are 60 years old, enjoying benefits of nuclear energy investments that were made by the company decades ago?

A. Yes, not only decades ago, but the investments we have made in the just completed EPU project. They're realizing those benefits today.

Q. Thank you. Moving to a different topic now.

Mr. Cavros also asked you some questions about what is marked as Exhibit 119, and this was a sensitivity analysis assuming zero CO2 compliance costs.

Do you recall that line?

A. Yes.

Q. What is your understanding of the position of SACE, or organizations like SACE, whether there should be regulation of CO2?

MR. CAVROS: Chairman, I'm going to object. That's a little outside the scope of the cross-examination, the intent of SACE.

CHAIRMAN BRISÉ: FPL.

MS. CANO: Thank you.

The line of questioning was envisioning a world where there is no CO2 regulation and how that impacts the project. And I'm just seeking to further explain the witness' answer by providing the context of what other organizations may be pursuing in other venues.

CHAIRMAN BRISÉ: Sure. I think we provided some latitude on the other side, so I think we'll provide latitude here, as well.

You may answer the question.

THE WITNESS: Thank you. Perhaps the best way to answer the question is to go back to a recent DSM goals docket in which SACE was a participant, and they argued very strongly that the CO2 cost that FPL was using to evaluate DSM programs, which actually were

quite a bit higher than what we have in our analysis for nuclear today, were far too low and needed to be greatly escalated.

MS. CANO: One more.

CHAIRMAN BRISÉ: Sure.

BY MS. CANO:

Q. You were asked quite a few questions about FPL's DSM and energy efficiency activities, and specifically FPL's commitment to DSM and energy efficiency. Do you recall those questions?

A. Yes.

Q. Could you please comment on FPL's commitment and whether it is nationally recognized for its DSM efforts?

A. Yes. We have been doing DSM since approximately 1980 when I first joined the company. In fact, my first ten years with the company was involved in designing, implementing, and evaluating DSM programs. We have never slacked off from that, and I think the company has been recognized not only for the staying power by which we have implemented DSM, but also particularly for the megawatt reduction from our DSM programs that have to date avoided the need for more than 14 generating units of 400 megawatts each. So it has been a considerable effort, a sustained effort, and

it's continuing today.

MS. CANO: Nothing further.

CHAIRMAN BRISÉ: Thank you. Let's deal with exhibits.

MS. CANO: FPL moves Exhibit 52 through 60 and 81 into the record.

CHAIRMAN BRISÉ: 52 through 60 and 81.

Are there any objections? Seeing none, we will move Exhibits 52 through 60 and 81 into the record.

(Exhibit Numbers 52 through 60 and 81 into the record.)

CHAIRMAN BRISÉ: Mr. Cavros.

MR. CAVROS: SACE requests that Exhibits 115 through 119 be entered into the record.

CHAIRMAN BRISÉ: 115 through 119?

MR. CAVROS: 119.

CHAIRMAN BRISÉ: All right. Thank you, Mr. Cavros.

Exhibits 115 through 119, any objections?

MS. CANO: Yes. FPL objects to Exhibits 117 and 119 solely on the basis that they are pieces of interrogatory responses, not the entire response. The entire response for each of these has already been moved into the record as one of staff's exhibits, and that's Exhibit Number 74. So we would just ask that we rely on

the full exhibit that has already been moved into the record.

CHAIRMAN BRISÉ: Okay. Mr. Cavros.

MR. CAVROS: I don't have an objection with that.

CHAIRMAN BRISÉ: Okay. So then we will do that.

Mary Anne, any suggestion here?

MS. HELTON: I'm sorry, could --

CHAIRMAN BRISÉ: Sure.

(Pause.)

MS. HELTON: I think that's fine.

CHAIRMAN BRISÉ: Okay. All right. So then what's that, 116 and 117?

MS. HELTON: No, 117 and 119 are partial exhibits. And exhibit number, I can't remember what --

MS. CANO: They are already in Exhibit 74.

MS. HELTON: They are already in Exhibit 74.

CHAIRMAN BRISÉ: Okay. So then Exhibit 74 will take care of those two exhibits. All right. Thank you.

(Exhibits 115, 116, and 118 admitted into the record.)

Any objections to that? Okay. Seeing none. Anything else for this witness?

MS. CANO: Nothing further. May he be excused?

CHAIRMAN BRISÉ: Yes. Doctor Sim, you may be excused. Thank you.

THE WITNESS: Thank you, sir.

(Transcript continues in sequence with Volume 5.)

STATE OF FLORIDA)

: CERTIFICATE OF REPORTER

COUNTY OF LEON)

I, JANE FAUROT, RPR, Chief, Hearing Reporter Services Section, FPSC Division of Commission Clerk, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

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

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

DATED THIS 14th day of August, 2013.

JANE FAUROT, RPR
Official FPSC Hearings Reporter
(850) 413-6732