(Case No. 95,444, etal.)

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Joint petition for determination of need for an electrical power plant in Volusia County by the Utilities Commission, City of New Smyrna Beach, Florida, and Duke Energy New Smyrna Beach Power Company Ltd., L.L.P.	DOCKET NO. 981042-EM

VOLUME 5
Pages 683 through 755

PROCEEDINGS:	HEARING
BEFORE:	CHAIRMAN JULIA L. JOHNSON COMMISSIONER J. TERRY DEASON COMMISSIONER SUSAN F. CLARK COMMISSIONER JOE GARCIA COMMISSIONER E. LEON JACOBS
DATE:	Wednesday, December 3, 1998
TIME:	Commenced at 9:30 a.m.
PLACE:	Betty Easley Conference Center Room 148 4075 Esplanade Way Tallahassee, Florida
REPORTED BY:	NANCY S. METZKE, RPR, CCR

C & N REPORTERS
REGISTERED PROFESSIONAL REPORTERS
POST OFFICE BOX 3093
TALLAHASSEE, FLORIDA 32315-3093
(850)697-8314 / FAX (850)697-8715

(APPEARANCES AS HERETOFORE NOTED)

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INDEX OF EXHIBITS

P R O C E E D I N G S

(Transcript Continues in Sequence from Volume 4)

Whereupon,

DALE M. NESBITT

was called as a witness by the Joint Petitioners and, after being first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. McGLOTHLIN:

Q Please state your name and business address, sir.

A My name is Dale M. Nesbitt. My business address is Altos Management Partners, 1250 Aviation Avenue, Suite 200-C, San Jose, with a J, California, 95110.

Q By whom are you employed?

A I'm employed with Altos -- by Altos Management Partners.

Q And for whom do you appear in this proceeding?

A I appear for the Utilities Commission of New Smyrna Beach and the Duke New Smyrna Beach L.L.P.

Q Doctor Nesbitt, did you prepare and submit prefiled direct testimony in this proceeding?

A I did.

Q Do you have it before you, sir?

A I do.

Q Do you have any changes, corrections or additions

to the prefiled testimony?

A Yes, I do have several changes to the prefiled testimony.

Q Would you identify those, please?

A Yes. The first such change occurs on Page 13, Line 25. Note six thousand megawatts, that six thousand should be 54 hundred megawatts, five thousand four hundred.

And on Page 14, line 5, the same six thousand megawatt number should read five thousand four hundred megawatts.

Q With those changes, sir, do you adopt the prefiled testimony as your testimony given today?

A Excuse me. No, I have a couple more changes, please.

On Page 39, Line 3, the number 69 should be replaced by the number 83. And on line 4, same page, Page 39, the number 92 should be replaced by the number 94. And I have a third change in the exhibit DMN-15.

Q We'll get to those separately, Doctor Nesbitt. With respect to the prefiled direct testimony, do you have any other changes?

A No, that concludes the changes.

Q As corrected or modified, do you accept the -- adopt the prefiled direct testimony as your testimony here

today?

A I do.

Q Now did you also prepare or supervise the preparation of exhibits identified as DMN-1 through 16?

A Yes, I did.

MR. McGLOTHLIN: I ask that an exhibit number be assigned to the exhibits attached to the prefiled testimony.

CHAIRMAN JOHNSON: 19. And what's the short title?

MR. McGLOTHLIN: It's composite exhibits of Doctor Dale Nesbitt's direct testimony.

CHAIRMAN JOHNSON: Okay.

MR. GUYTON: Madam Chairman, I have only 17. Have I missed an exhibit here?

CHAIRMAN JOHNSON: I think that's the one that might have been the question. I marked as 18 -- is Mr. Wright here? -- in Mr. Green's testimony the Figures 1 and 2 in the exhibits filed from August 19th, 1998, as well as Sections 2.A, 2.3, 2.D that he identified in his particular testimony. I thought that Scheff wanted those identified separately.

MR. WRIGHT: Madam Chairman, that is my confusion for which I apologize that I have created. I meant to identify them as part of what had already identified as 16.

CHAIRMAN JOHNSON: So you wanted all that to come in in 16?

MR. WRIGHT: Yes, ma'am.

CHAIRMAN JOHNSON: The whole filing?

MR. WRIGHT: Yes, ma'am, so it can stay together.

CHAIRMAN JOHNSON: Okay. I thought --

MR. WRIGHT: And I apologize for the confusion. I was actually in my car to see if we had an extra unwritten on copy that I could provide right now.

CHAIRMAN JOHNSON: Okay.

MR. WRIGHT: Everybody has had it. We filed it on August 19th.

CHAIRMAN JOHNSON: Sure. Okay. So --

MR. WRIGHT: So?

CHAIRMAN JOHNSON: That's fine. I'll treat that then as -- So you didn't need to identify it again; it had already been admitted?

MR. WRIGHT: It has been identified as Exhibit 16 with respect to those parts thereof that Mr. Vaden sponsored through his testimony.

CHAIRMAN JOHNSON: I see. I think I'm following you. What I was following you -- I thought you had said was Vaden -- you wanted to identify certain excerpts and they had been admitted, those excerpts had been admitted.

MR. WRIGHT: Right. I --

CHAIRMAN JOHNSON: And now you just want to admit the other ones?

MR. WRIGHT: I had been thinking to do it the way I conceive of it as being by the book, Madam Chairman; and that is, to identify those parts sponsored by each witness and go forward with them, identify them at the outset of each witness's testimony and move them at the conclusion of each witness's the testimony. My colleague to my right, Mr. Moyle, obviously had the very good and efficient idea of just moving the whole thing all at once were there to be no objection, and so I was trying to facilitate that as I was running out to my car.

CHAIRMAN JOHNSON: Okay. Very good.

MR. WRIGHT: And we might be able to just ask -- we might be able to just ask right now if everybody knows. The filing document has been -- it's been here and been in all parties' possession since August 19th. I think, be it without objection, I'll furnish a clean copy to the court reporter by tomorrow morning.

CHAIRMAN JOHNSON: Any objections to admitting the filing document?

MR. GUYTON: Commissioners, Florida Power & Light is going to raise an objection to at least part of it.

CHAIRMAN JOHNSON: Okay. So we'll have to go segment by segment.

MR. WRIGHT: Okay.

CHAIRMAN JOHNSON: Now did we admit the portions that were sponsored by Green?

MR. WRIGHT: Yes, ma'am, I believe so.

CHAIRMAN JOHNSON: Okay. I understand. So then -- so that the record is clear, there is no separate Exhibit 18 that relate to the filing document; and, therefore, the next exhibit will be Exhibit 18, and that is the composite exhibit.

MR. McGLOTHLIN: And while we are on that subject, Chairman Johnson: Doctor Nesbitt, did you also prepare or supervise the preparation of what has been identified as Table 10 and Part 1 of Table 15 which is attached to the August 19th exhibits?

WITNESS NESBITT: Yes, I did.

MR. McGLOTHLIN: And that would be part of what has been identified as 16 as I understand your ruling?

CHAIRMAN JOHNSON: Uh-huh.

MR. McGLOTHLIN: I ask that the prefiled direct testimony be inserted into the record as though read at this point.

CHAIRMAN JOHNSON: It will be inserted into the record as though read.

IN RE: JOINT PETITION FOR DETERMINATION OF NEED BY THE UTILITIES COMMISSION, CITY OF NEW SMYRNA BEACH, FLORIDA AND DUKE ENERGY NEW SMYRNA BEACH POWER COMPANY, FPSC DOCKET NO. 981042-EM

DIRECT TESTIMONY OF DALE M. NESBITT, Ph.D.

Q: Please state your name and business address.

A: My name is Dale M. Nesbitt and my business address is Altos Management Partners Inc., 1250 Aviation Avenue, Suite 200C, San Jose, CA 95110.

Q: By whom are you employed and in what positions?

A: I am presently Chief Executive Officer and President of Altos Management Partners Inc. 1250 Aviation Avenue, Suite 200C, San Jose, CA 95110. Altos Management Partners Inc. is a Management Consulting firm. I am also a Director, President and Chief Executive Officer of MarketPoint Inc., 27121 Adonna Ct., Los Altos Hills, CA 94022. MarketPoint Inc. is a software development and support firm. I am also a Director and Vice President of Reticle Inc., 27121 Adonna Ct., Los Altos Hills, CA 94022. Reticle is a chemical and mineral technology company.

Q: Please describe your duties with Altos Management Partners.

A: I helped found Altos Management Partners Inc. in 1995 and assumed the position of Chief Executive Officer and President of Altos Management Partners in January 1998. I am responsible for business development, leadership, technology

and technique development, communication, strategic direction, project supervision, staff development, and other fiduciary and management roles at Altos. My duties include working on client projects in addition to the foregoing roles. I founded MarketPoint Inc. in 1996 and assumed the position of President and Chief Executive Officer at that time. I am responsible for business development, leadership, software development, training, documentation, communication, staff development, project supervision, and other fiduciary and management roles at MarketPoint. In 1998, I founded Reticle Inc. and presently serve as a director and Vice President. My duties include marketing and business development.

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

Q: Please summarize your educational background and experience.

A: I earned a B.S. degree in Engineering Science from the University of Nevada, Reno with high honors in 1969. I earned an M.S. degree in Mechanical Engineering from Stanford University in 1970, another M.S. degree in Engineering-Economic Systems from Stanford University in 1972, and a Ph.D. degree in Engineering-Economic Systems from Stanford University in 1975. My doctoral dissertation was accepted with honors from Stanford. I am a member of Phi Kappa Phi (national honorary society) and Sigma Tau (national honorary engineering society).

DIRECT TESTIMONY OF DR. DALE M. NESBITT

Q: Please summarize your employment history and work experience.

A: I joined Xerox Corporation at their Palo Alto Research Center in 1972 as an analyst in the management systems group. In 1974, I left Xerox to join Stanford Research Institute (SRI) as a Decision Analyst in its Decision Analysis Group. When I left SRI in 1977, I was Manager, Decision Analysis—Energy. In 1977, I co-founded Decision Focus Incorporated (DFI), a private management consulting firm practicing in the oil, gas, electricity, telecommunications, air transportation, leisure services, environment, and high technology industries. I later helped found and later joined Altos Management Partners, originally as a Senior Consultant and now as Chief Executive Officer, and President, where I have helped consolidate Altos' oil, gas, and electricity modeling and management consulting practice. Altos' services now include short and long run models of North American gas (NARG), North American electricity, world and North American oil markets, a World Gas Trade program, a Western European gas program, a Southern Cone of South America Gas Model, a Southeast Australia Gas Model, an Electric Asset Operational Model, an asset valuation model, and a risk management and probabilistic analysis model. I recently founded MarketPoint Inc., which develops, sells, and supports economic modeling software, and Reticle, Inc., a chemical and mineral technology company. During my time in the consulting business, which has been continuous since 1974, I have served

most of the multinational oil companies based in North America, most of the North American natural gas pipelines, and a number of North American electric companies.

Q: Have you previously testified before regulatory authorities or courts?

A: Yes. I have provided testimony to a number of different state and national regulatory bodies. For example, I have testified before the Economic Regulatory Administration of the United States government in support of the TransAlaska Gas Pipeline System. I provided testimony before the National Energy Board of Canada in support of the McKenzie Delta pipeline (in behalf of Gulf, Exxon, and Shell) and in a different proceeding provided testimony in behalf of TransCanada's application for eastward expansion. I testified before the Federal Energy Regulatory Commission in support of Pacific Gas Transmission Company's ("PGT") roll-in application. I provided testimony before the British Columbia Utilities Commission (BCUC) in behalf of BC Gas' application for the Southern Crossing pipeline project. I provided testimony before the California Public Utilities Commission in support of Pacific Gas and Electric's application for rate relief and roll-in regarding Lines 400 and 401. I have provided testimony before the California Energy Commission on a number of issues ranging from Southern California Edison's application for a firm transportation

agreement on PGT to offering information regarding appropriate discount rates and rates of return to ascribe to private companies who endeavor to enter California.

PURPOSE AND SUMMARY OF TESTIMONY

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

A: I am testifying on behalf of the Utilities Commission of New Smyrna Beach, Florida ("UCNSB"), and Duke Energy New Smyrna Beach Power Company Ltd., L.L.P. ("Duke New Smyrna"), the joint applicants for the Commission's determination of need for the New Smyrna Beach Power Project (or "the Project").

Q: What are the key questions addressed by your testimony?

A: My testimony addresses several questions related to the New Smyrna Beach Power Project, including the following:

1. Is there a need for 500 MW of electric generation capacity and associated energy production in the Peninsular Florida market? The answer is yes, and the need is immediate.
2. Is the proposed New Smyrna Beach Power Project the most cost-effective option to provide this capacity and energy? The answer is yes; the natural gas combined cycle technology of the New Smyrna Beach Power Project is the most cost-effective option for capacity and energy in the Peninsular Florida market. It is better than gas simple cycle, coal, oil, or other technologies.

3. Will the Duke New Smyrna Beach project be economically viable? The answer is yes. It will impose zero risk on Florida ratepayers because it is a merchant plant, reduce prices in the Florida market by virtue of its entry, and make money for its owners.

4. Will energy from the Duke New Smyrna Beach project be sold out of state? The answer is no, but even if it were, it would be strictly excess with regard to the Florida market.

5. What benefits, if any, will the Duke New Smyrna Beach project provide to Florida ratepayers? It will increase energy supply, decreasing Peninsular Florida energy prices relative to where they would otherwise be as a result. It will impose zero risk on Florida ratepayers. Florida ratepayers will not be obliged to buy energy or capacity from the project unless it is cheaper than all competing alternatives. It will reduce environmental emissions relative to what otherwise would occur because it is based on a low heat rate gas combined cycle configuration.

Q: Are you sponsoring any exhibits to your testimony?

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

DMN-1. Altos North American Regional Electric Model (graphic).

DMN-2. Altos North American Regional Gas Model ("NARG Model) (graphic).

DMN-3. 1998 Florida Load Duration Curve.

DMN-4. 1998 SERC/Southern Load Duration Curve.

DMN-5. Florida Capacity per NERC

DMN-6. Southern Capacity per NERC.

DMN-7. New Smyrna Beach Power Project, Projected Operations and Fuel Savings.

DMN-8. Florida - 1998 Baseload (40%).

DMN-9. Florida Dispatch - 1998 High Load Factor Intermediate (25%).

DMN-10. Florida Dispatch - 1998 Low Load Factor Intermediate (15%).

DMN-11. Florida Dispatch - 1998 High Load Factor Peak (15%).

DMN-12. Florida Dispatch - 1998 SuperPeak (5%).

DMN-13. Comparative Electricity Production Costs, SERC & FRCC, 1995-1998.

DMN-14. Benefits of Duke New Smyrna Beach Power Project (graphic).

DMN-15. Achieving Competitive Advantage Through Quantitative Electric Asset Valuation Using the Altos North American Regional Electricity Model.

DMN-16. Overview of the North American Regional Gas (NARG) Model.

I am also sponsoring Table 10 and Part I of Table 15

contained in the Exhibits submitted on August 19, 1998.

METHODOLOGY

Q. How have you addressed the foregoing questions regarding the New Smyrna Beach Power Project?

A: I have developed the information necessary to answer the foregoing questions by combining my company's (Altos's) North American Regional Electricity Model ("the Altos Model" or "the Altos Electric Model") illustrated in Exhibit ____ (DMN-1) and described more fully in Exhibit ____ (DMN-15), the associated Altos data base for that model, the North American Regional Gas (NARG) Model illustrated in Exhibit ____ (DMN-2) and described more fully in Exhibit ____ (DMN-16), and Altos's experience in the gas and electricity businesses.

Q: Please provide a brief history and methodology of the Altos North American Regional Electricity Model.

A: The Altos North American Regional Electricity Model is a 32-region integrated model of the North American electricity system that includes generation, transmission, consumption, fuels, and fuel competition. The Altos Electric Model includes all of the generation regions, all of the existing and prospective transmission interconnections, and all of the demand regions of North America. Generally speaking, the Altos Model includes all of the reliability coordinating regions in the U.S., Canada, and Mexico, plus numerous sub-

regions. For example, the model treats the Southern Electric Reliability Council region ("SERC") as four separate sub-regions: the Southern Company system, TVA, VCR (Virginia and the Carolinas), and Entergy, which was formerly designated as the southeastern component of the Southwestern Power Pool.

The Altos Electricity Model includes transmission system integration and interconnection, consideration of multiple fuels and energy products, existing capacity and its cost structure, future changes in the cost structure of existing plants, retirements and decommissioning, new generation plant entry, inbound and outbound transmission capabilities, transmission entry, and demands and load shapes that vary over time within each region. In evaluating future capacity energy needs, the Altos Model considers the following generating technologies: gas/oil combustion turbine, gas combined cycle, oil combined cycle, pulverized coal, coal gasification combined cycle, nuclear, gas/oil steam, and waste-to-energy.

The North American Regional Gas Model (the "NARG Model") includes all gas supply basins, all existing and prospective interconnecting pipelines, and all of the gas demand regions of North American. In the NARG Model, each category of resource in each supply region is characterized by a detailed supply sub-model, each pipeline is characterized by a detailed transportation sub-model, and each demand region is characterized by a detailed demand sub-model. The NARG Model

estimates, over time, the set of regional prices that simultaneously clear the markets in every wellhead, wholesale, and other market in North America.

Exhibits ____ (DMN-15) and ____ (DMN-16) to my testimony summarize the history and methodology of the Altos North American Regional Electricity Model and the NARG Model.

Q: Who uses the Altos North American Regional Electricity Model and the NARG Model?

A: Many of the major producers and pipelines and a number of the electric companies in North America have used my NARG and North American Electricity Models. I am allowed to disclose nothing other than the names of those users, the list of which includes Amoco, Arco, Associated Electric Cooperative, Inc., BC Gas, BHP Petroleum (Broken Hills), BP, British Gas Corporation, California Energy Commission, Canadian Energy Research Institute, Chase Manhattan Bank, CIA, Coastal/Colorado Interstate Gas, Conoco/DuPont, DOE/EIA, Duke Energy/Panhandle Eastern, El Paso, Enron, Exxon, LLL, LBL, Argonne, Oak Ridge, Los Alamos, MidCon/Occidental Petroleum, Mobil, National Energy Board of Canada, Nova Corporation, Oklahoma Gas and Electric, PanCanadian, Pennsylvania Power and Light, Petro-Canada, PG&E/PGT, Shell, So Cal Edison (SCE Corp.), Sonat, Texas Utilities Corporation, TransCanada Pipeline Corporation, TVA, and the Williams Companies. I can disclose what the foregoing users might have chosen to put

into the public domain.

Q: Has the model been independently validated by a third party?

A: Yes. The Energy Information Administration ("EIA") of the United States government decided in 1980-1 to independently validate the GEMS model (GEMS was the tradename of our model at that time.) EIA expended in excess of $1 million (in 1981 dollars) with Oak Ridge National Laboratories to validate our GEMS. In particular, EIA endeavored to verify and validate the software, data, results, underlying economic theory, suitability and completeness of documentation, accuracy of forecasts, proper program implementation, sensitivity analysis, and other relevant attributes of the program. In effect, EIA subjected GEMS to a severe and comprehensive professional peer review in order to ensure that it was operating correctly and was appropriate for EIA's intended needs. (In EIA's judgment, Oak Ridge was an independent third party who could perform an objective, disinterested, credible, independent, third party validation.) As part of the validation, Oak Ridge made a number of suggestions (which were ultimately incorporated into our model and software), and they gave the GEMS approach and software a clean bill of health. To my knowledge, our GEMS is the only model in existence that has been independently validated to such a degree.

Q: Before leading us through your detailed results, could you summarize the cost structure and performance you have assumed for the New Smyrna Beach Power Project?

A: I have assumed that the heat rate of the New Smyrna Beach Power Project will be 6,832 Btu per KWh at full load. Because the Altos Electric Model projects substantial run times for the New Smyrna Beach Power Project, I have not considered partial load heat rate performance of the facility (i.e., heat rate curves). I have assumed that the fully commoditized, variable, all-in, forward operating and maintenance cost of the New Smyrna Beach Power Project will be $2.30/MWH. This is consistent with what at least one vendor is offering in new combined cycle equipment it proposes to build. I understand from Duke New Smyrna that the projected in-service cost of the 500 MW New Smyrna Beach Project, including the transmission interconnection to the Smyrna Substation of the UCNSB, is approximately $160 million. This cost estimate includes permitting costs but does not include the costs of downstream transmission upgrades.

Q: Have you used Duke New Smyrna or UCNSB proprietary or confidential assumptions, data, or analysis in preparing your testimony?

A: Not to my knowledge. My testimony is based on my own work and assumptions and that of my Altos colleagues, particularly

Michael C. Blaha, with whom I have collaborated in preparing this testimony. While the work underlying this testimony was done under sponsorship by Duke New Smyrna, the work represents my and Altos's best judgment. To wit, the forward price calculations and their implications for the project are drawn from Altos's models, data, analyses, and personnel. They are not drawn from proprietary or confidential data from Duke New Smyrna, the UCNSB, or any of their affiliates, nor are they drawn from analysis or data provided by Duke New Smyrna or the UCNSB. My objective has been to apply and put forth my and Altos' best professional analysis and judgment based on our best available technology, experience, and data, not to mirror Duke New Smyrna's or the UCNSB's analyses or projections.

NEED FOR THE NEW SMYRNA BEACH POWER PROJECT

Q: Is there a need for 500 MW of new electric generation capacity and associated energy production in the Peninsular Florida market?

A: Yes, there is a need for more than 500 MW of new electric generation capacity and associated energy production in the Peninsular Florida market, the need is immediate, and the need is growing over time. The Altos North American Regional Electricity Model projects economically viable and profitable new additions of up to 6,000 MW of new gas-fired combined cycle ("CC") power plants in Peninsular Florida, which I use

synonymously with the Florida Reliability Coordinating Council ("FRCC") region, and several tens of thousands of MW of new gas CC entry elsewhere throughout North America. Our predicted substantial quantity of new installed capacity in Peninsular Florida--6,000 MW--is approximately twice the quantity of new capacity that FRCC itself reported to NERC in FRCC's 1997 OE411 Annual Report. This is a strong statement in favor of the viability, need, and strong positive contribution of new gas CC capacity entry into the Florida market of the type Duke New Smyrna is proposing. In summary, there is a need for more than the 500 MW proposed by Duke New Smyrna.

I should emphasize that I have not approached the question of "need" simplistically by measuring peak Florida demand (expressed in GW); adding up available installed capacity (expressed in GW), and comparing the two using some criterion such as reserve margin or loss-of-load-probability. (I should add, however, that even this simplistic comparison would underscore the need for projects such as the New Smyrna Beach Power Project). A simplistic "add up the installed capacity and compare against peak demand" notion of "need" such as the forgoing misses the fundamental reality that some of the old installed capacity in Florida is higher in cost than what new capacity could be installed for. Installing new capacity will eliminate old, uneconomic capacity, obviate the requirement to preserve and/or run it, and reduce the

intrinsic cost to generate electricity in Florida. A critically important element of the need for new capacity is the need to retire old, uneconomic, and usually pollution-intensive capacity. (By analogy, the "need" for a new car is a need to retire your old 1972 Chevy Vega you would otherwise have to maintain and drive, thereby avoiding the much higher operating and maintenance cost and downtime of the Vega.)

The Altos Electric Model predicts that there are few places in North American where the need for new gas CC generation is more acute and more immediate than in Peninsular Florida. Florida is growing, and Florida electricity is expensive. New capacity such as the New Smyrna Beach Power Project is needed to meet inevitable growth in the state, ameliorate the current and future market price, and provide economic benefits via reduced market prices to the state of Florida.

Q: What is the historical and projected future load situation in Florida?

A: Altos has assembled hourly reported data for every hour in the past five years (including 1997) for every reporting entity in Florida (and elsewhere in the United States). This data has allowed us to assemble average daily load shapes, maximum daily load shapes, monthly load duration curves, and annual load duration curves for the Peninsular Florida market. Exhibit ___ (DMN-3) depicts the load situation in

Peninsular Florida inferred from reported hourly loads during every hour of the past five years. Exhibit ____ (DMN-3) indicates within each monthly time interval the average daily load shape for days in that month, the maximum daily load shape, and the minimum daily load shape. (The daily curves are the up-down-up-down curves shown for each month in the figure.) The hourly loads are ordered by hour in the month from highest load hour in the month down to lowest load hour in the month. This process of ordering from highest to lowest produces the monthly load duration curves, which are the downward sloping curves in the exhibit beginning at the start of each indicated month and ending at the end of that month. The exhibit also indicates the annual load duration curve beginning at the upper left and dropping to the lower right of the entire diagram. The annual load duration curve is the ordered set of annual loads from highest to lowest in descending order. These are the fundamental historical demand data that characterizes the Peninsular Florida market in aggregate. (Altos has undertaken this task for every one of the 32 regions of North America that are represented in the Altos Model so that we can understand the hourly, weekly, monthly, and annual demand profiles over the past five years and can reliably extrapolate it to the future.)

As seen in the monthly load duration curves in Exhibit ____ (DMN-3), peak demand in the FRCC/Florida market occurs in the summer, just as it does throughout most of the

southern United States. However, unlike the rest of the southeastern United States, particularly SERC/Southern, the demand in Peninsular Florida during the winter months is more volatile. Interestingly, the observed winter peak is almost as high as the observed summer peak; however, the load variability during the winter is higher than the variability during the summer. The SERC/Southern region has been served by large gas pipelines over the years (e.g., Sonat, Transcontinental), and gas has penetrated the winter heating market there. A larger proportion of Florida customers rely on resistance heat during cold winter days, owing in part to the historical paucity of natural gas in Florida, rendering winter electricity demand volatility higher in Florida. The higher winter price volatility in Florida has consequences for the price differentials between the SERC/Southern region and Peninsular Florida during the winter and for the propensity to move power from Southern to Peninsular Florida during the winter.

As seen in the monthly load duration curves in Exhibit ____ (DMN-3), Florida is a dual peaking market. The peak-to-base ratio during the summer is calculated to be approximately 2.5:1, larger than the corresponding ratio in SERC/Southern and elsewhere in SERC. Obviously, Florida experiences strong peaks in the summer. However, the winter peak-to-base ratio in Peninsular Florida is nearly 3:1, presaging higher volatility of demand in the winter than in

the summer. A plant such as the New Smyrna Beach Power Project built in Florida can take advantage of two peaks, but a plant built in SERC/Southern or other southern United States locations often can take advantage of only one.

The ability of Florida generators to capture two peak markets presents an interesting advantage for building new capacity in Florida as Duke New Smyrna and the UCNSB are proposing. It also raises the possibility, however, that during the winter, inbound transmission from SERC/Southern (which might be somewhat slack during the winter) will make up the Florida winter peak deficit. The Altos Model tells which is the better winter alternative -- new generation from the New Smyrna Beach Power Project versus more inbound transmission from Southern. (The Altos Model shows that indigenous combined cycle generation in Florida such as the New Smyrna Beach Power Project is better.) Referring back to Exhibit ____ (DMN-3), it is unlikely that there will be summer energy or capacity available to be imported into Peninsular Florida from points north. During the summer, the New Smyrna Beach Power Project will pay substantial benefits to Florida ratepayers by simply directly producing into the Florida market. The exhibit further suggests that prices will be firm for a substantial portion of the summer and winter, but not necessarily during spring and fall, months. The Altos Model will verify that fact as well, but the spring and fall prices will not fall low enough to knock the Project

out of the mix very frequently. The model confirms that the Project will evolve rather quickly to become a baseload plant.

It is also important to consider and understand the role of the SERC/Southern region in these analyses of the Project. Exhibit ____ (DMN-4) illustrates the comparable load information for SERC/Southern as was presented for Peninsular Florida in Exhibit ____ (DMN-3). The magnitude of the winter peak in the SERC/Southern region is smaller, in relative terms, than the winter peak in Florida. This means that there will be excess energy exportability from Southern to Florida at all times except the summer peak. Furthermore, it is possible that the value of surplus exportability from Southern to Florida during the winter will be attractive in Florida (which should have substantially higher prices than Southern in the winter.) This is not a trivial insight, and it is explicitly accounted for in the Altos Model. The Model calculate the fair market value of energy in Southern during every month of the year and consider its prospective competitiveness against energy from other sources in Florida during every month of the year. This is critical to proper valuation of the New Smyrna Beach Power Project.

I should point out that I have subdivided each of the 12 monthly load duration curves in Exhibits ____ (DMN-3) and ____ (DMN-4) into five discrete blocks for every region in the Altos Electric Model. The five blocks, which range

successively from base load to peak, are designated as follows.

1. Baseload (P1) – 40 percent of the hours in the month, i.e., those 40 percent of the hours with the lowest average load. This category represents the 0^{th} to the 40^{th} percentile of load.

2. High Load Factor Intermediate (P2) – those 25 percent of the hours in the month with the next higher average load. This category represents the 40^{th} percentile to the 65^{th} percentile of load.

3. Low Load Factor Intermediate (P3) – those 15 percent of the hours in the month with the next higher average load. This category represents the 65^{th} percentile to the 80^{th} percentile of load.

4. High Load Factor Peak (P4) – those 15 percent of the hours in the month with the next higher average load. This category represents the 80^{th} percentile to the 95^{th} percentile of load.

5. Low Load Factor Peak or Superpeak (P5) – those 5 percent of the hours in the month with the highest average load. This category represents the 95^{th} percentile to the 100^{th} percentile of the load.

The Altos North American Regional Electricity Model will calculate market clearing prices for each of these categories of load for each month of the year, thereby dividing annual load into 60 time increments.

Q: What is the installed capacity in Peninsular Florida and Southern as compared with the foregoing daily, monthly, and annual load information?

A: The capacity situation in the Florida market according to NERC is summarized in Exhibit ____ (DMN-5), and the capacity situation in the Southern market according to NERC is summarized in Exhibit ____ (DMN-6). If we compare installed capacity in Peninsular Florida against the load duration curves in Exhibit ____ (DMN-3) that describe the present situation, Florida is short of baseload capacity, having a total of only 13,000 MW of existing base load capacity (coal, nuclear, and hydro). It is apparent from the curves in Exhibit ____ (DMN-3) that Florida is short of on-peak capacity as well. In fact, there is not enough installed indigenous base load capacity (13,000 MW) to meet hourly demand during most of the hours of the year. The "bottoms" of the monthly load duration curves in Exhibit ____ (DMN-3) are chronically above the 13,000 MW level, meaning that Peninsular Florida is and will remain for the foreseeable future chronically underserved in baseload energy. New power plants such as the New Smyrna Beach Power Project are critical if Florida is to relieve itself from the shortage of baseload capacity that presently faces the state. The model results will show that the New Smyrna Beach Power Project will initially run as an intermediate load plant but after a very few years will operate in baseload and will make up part

of the difference between presently installed capacity and the bottoms of the monthly load duration curve. In short, Peninsular Florida is in a base load deficit condition, one that has traditionally been supplemented by baseload transmission imports from Southern.

Note further in Exhibit ____ (DMN-5) that Peninsular Florida is anticipating adding combined cycle units (approximately 3,000 MW by 2006) and buying more power from out-of-state providers. It is instructive to note in the Southern projection in Exhibit ____ (DMN-6), which is the Southern analog of Exhibit ____ (DMN-5), that those very out-of-state buyers are not planning to add capacity to sell it Florida. In fact, they are projecting reduced, not increased, electric sales to Florida. There is an intrinsic mismatch here. The Project will fill part of this mismatch and shelter Florida electric customers from higher prices. The Altos Electric Model tells us how this mismatch will be resolved both in terms of price and energy flows.

Returning to Exhibit ____ (DMN-5), almost all the indicated 23,000 MW of existing Florida oil-and-gas-fired steam-turbines, combustion-turbines and combined-cycle units have heat rates in excess of that of the proposed New Smyrna Beach Power Project (projected at 6,832 Btu/KWh). This means that the Project will be inframarginal relative to virtually all of the existing oil and gas power plants in Florida and will operate in preference to them. The majority of existing

Florida units are old and are not state-of-the-art. The presently existing Florida peaking units will continue to be run when inbound transmission is constrained or when Southern's coal facilities are fully dispatched and diverted elsewhere (to an increasing degree staying right at home in Southern to meet their growing indigenous peak demand). Introducing inframarginal sources of the type Duke New Smyrna and the UCNSB are proposing will pay immediate and substantial benefits not only to the owners of the new inframarginal Florida plants but also to the market as a whole through price softening, particularly during time of peak.

COST-EFFECTIVENESS OF THE NEW SMYRNA BEACH POWER PROJECT

Q: Is the proposed power plant the most cost-effective alternative available to provide additional power supply resources in Peninsular Florida?

A: Yes. The Altos Electric Model confirms that gas-fired combined cycle technology, like that of the proposed Project, is the most cost-effective generation technology to add in Peninsular Florida. The fact that the Project is the most cost-effective alternative is underscored by the fact that gas CC technology is currently the technology of choice for Florida utilities and for many utilities throughout the United States. (The Altos Electric Model indicates that new entry of gas CC capacity will be one of the most important

contributors to future energy flows as well as a key driver of future energy prices.) For example, the proposed Cane Island 3 plant of the Florida Municipal Power Agency and the Kissimmee Utilities Authority, FPL's proposed repowering projects, Lakeland's planned "phased" combined cycle unit, and the City of Tallahassee's approved Purdom 8 unit, are all projected to use this same gas CC technology.

Q: Is the proposed power plant the most cost-effective alternative available for Duke New Smyrna in order to meet its obligations to the UCNSB and as a merchant power provider in Peninsular Florida?

A: Yes. The proposed Project is not only the most cost-effective alternative for the FRCC/Peninsular Florida market, it is also the most cost-effective alternative for Duke New Smyrna to meet its obligations to the UCNSB and as a merchant power provider in the Peninsular Florida market. This result follows directly from the above observations: if the best technology for the overall market is gas-fired CC capacity, then the best technology for an individual supplier, such as Duke New Smyrna, is that same technology. Again, this result is also confirmed by the observed fact that gas-fired CC capacity is the technology of choice for new capacity in Florida and across the U.S.

Q: What alternative generation technologies does the Altos North American Regional Electric Model consider in evaluating whether a proposed power plant is the most cost-effective alternative for a given situation?

A: The Altos Model considers gas-fired and oil-fired combustion turbines, gas-fired and oil-fired combined cycle units, gas-fueled steam generation units, oil-fueled steam generation units, pulverized coal units, integrated coal gasification combined cycle ("IGCC") units, nuclear units, and waste-to-energy technologies.

ECONOMIC VIABILITY OF THE NEW SMYRNA BEACH POWER PROJECT

Q: Please comment on the economic viability of the New Smyrna Beach Power Project.

A: In a competitive environment, a cost-effective facility is by definition economically viable. Indeed, merchantization and commoditization of a market favor the low cost provider. I have discussed and demonstrated that the gas CC technology is inframarginal in Florida, meaning that new plants such as the Project are economically viable and profitable The New Smyrna Beach Power Project is clearly economically and competitively viable.

Q: Are there any key market uncertainties that could depress Peninsular Florida/FRCC prices and spark spreads and hurt the Project's viability?

A: Not to my knowledge. The foregoing results certainly suggest that increasing transmission capability into Peninsular Florida from Southern and points north could put strong downward competitive pressure on Florida prices. I have run a case in which the inbound transmission capability from Southern is nearly doubled from its first contingency capability today of 3,600 MW up to 7,000 MW. This case depresses Florida prices and spark spreads a bit, but not enough to eliminate gas CC entry from Florida. The reason is that the coal units will be just as constrained in SERC and FRCC with or without new transmission capability into Florida. By opening up the market, new gas CC capacity moves more quickly and more completely to the margin in the whole region. New gas CC in Southern is actually less attractive to Florida than new gas CC in Florida. Almost doubling inbound transmission capability into Florida does not kill or daunt the need for new gas CC entry into Florida.

I have also run a completely unlimited and unconstrained inbound transmission case from every region into every other region shown in the model in Exhibit ____ (DMN-1). Our intention was to represent a case in which any incremental transmission project that experienced a high enough price differential across that project would be immediately and completely built. This unlimited transmission case, which incidentally carried a uniform $3/MWH inter-regional wheeling charge from every region to every contiguous region in

Exhibit ____ (DMN-1), did indeed daunt gas CC entry into Florida. In this case of unlimited low cost transmission, the gas CC business shifted en masse to Entergy (Louisiana) in order to be close to the cheapest natural gas on the continent. Because electric transmission is so cheap and so ubiquitous by assumption in this case, the cycling and peaking generation industry in the eastern and southern United States shifts quite quickly and dramatically into Louisiana and Texas, and a huge outbound electric transmission business is built to serve them. While this case might not represent the future configuration of the electric system, it clearly implies that the more transmission that becomes available into Florida, the more the gas CC industry shifts upstream to the lower gas price regions and away from the higher gas price regions. This makes good intuitive sense.

Over a broad range of alternative scenarios constructed in the past with the Altos Model, we have seen the Florida spark spreads remain quite robust, and we have seen the propensity for a substantial amount of gas CC entry into Florida. No reasonable sensitivity case changes the fact that Florida is short of capacity, baseload as well as peaking capacity. No reasonable sensitivity case changes the fact that Florida must either install needed capacity or purchase it over transmission lines from afar.

PROJECTED OPERATIONS OF THE NEW SMYRNA BEACH POWER PROJECT

Q: Please summarize the projected operations of the Project.

A: Exhibit ____ (DMN-7) summarizes the projected operations of the New Smyrna Beach Power Project for the period 2002 through 2012. This table shows that the Project is expected to operate at Capacity Factors ranging from approximately 83 percent in 2002, its first full year of operation, when its projected generation is 3,719,550 MWH, to approximately 94 percent in 2012, when it is expected to produce more than 4,200,000 MWH.

Q: Can you discuss the plant operation predictions from the model? More specifically, what plants will dispatch to what degree in what hours in what months?

A: Let me answer that question by proceeding through the Florida market in order: baseload (40% of the time), high load factor intermediate load (25% of the time), low load factor intermediate load (15% of the time), high load factor peak (15% of the time), and low load factor peak (superpeak, 5% of the time). I have assembled the Exhibits ____ (DMN-8) through ____ (DMN-12) from the Altos Electric Model run to depict plant dispatch in Florida for base (P1), high load factor intermediate (P2), low load factor intermediate (P3), high load factor peak (P4), and superpeak (P5).

Q: Does the Altos Electric Model indicate whether Duke New Smyrna is likely to sell any power outside Peninsular Florida?

A: Yes. My analyses indicate that very little, if any, power generated by the New Smyrna Beach Power Project will be sold outside Peninsular Florida, i.e., outside the FRCC region. In fact, my analyses indicate that, for a limited number of hours each year, the Project may actually decrease imports of coal-fired power from the SERC region. The economic success of the project does not depend on the project selling any power outside Peninsular Florida. Indeed, the project does not anticipate selling power outside Peninsular Florida.

Q: Are you aware of other evidence to support your conclusion that the output of the New Smyrna Beach Power Project will be sold entirely, or almost entirely, within Peninsular Florida?

A: Yes. The PowerDAT generation cost data published by Public Utilities Fortnightly shows that the raw generation costs of power generated within the FRCC is significantly, even dramatically, higher than the comparable raw generation cost of electricity produced in the SERC region. For example, Exhibit ____ (DMN-13) presents summary data for FRCC and SERC for 1997 and also for January through March 1998. (These are the most current and complete data available.) These data show that for 1997, and for the first quarter of 1998, the average generation cost (fuel plus variable operation and

maintenance cost) in FRCC was **more than 50 percent greater than** the comparable average generation cost in the SERC region. For 1996, the difference was even greater. This demonstrates conclusively that the primary wholesale market for the output of the New Smyrna Beach Power Project is within Peninsular Florida.

BENEFITS PROVIDED BY THE NEW SMYRNA BEACH POWER PROJECT

Q: What benefits, if any, is the New Smyrna Beach Power Project likely to provide to Florida and its electric ratepayers?

A: The Project will increase energy supply, decreasing Florida energy prices relative to where they would otherwise be as a result. It will also limit or dampen market power, while imposing zero financial and operating risk on Florida ratepayers. Florida ratepayers will not be obliged to buy energy or capacity from the Project unless it is cheaper than all competing alternatives. It will reduce the quantity of fuel consumed for electricity generation, including both oil and gas that would otherwise be burned in much less efficient power plants, and will also reduce environmental emissions relative to what otherwise would occur because it is based on a low heat rate gas combined cycle configuration.

Q: Market power and market concentration among resident generators might become an issue in Florida. Would the entry of the New Smyrna Beach Power Project increase or decrease

market power and concentration relative to the level that would otherwise exist?

A: The Project's entry and presence would decrease whatever market power and market concentration would otherwise exist in Florida. I have not attempted for this analysis to quantify whether market power exists or is being exerted in Florida by any of the players individually or collectively. It is clear, however, that the entry of new facilities that are small in the overall scheme of the market and are owned by independent entities without any prospect of market power reduces whatever market concentration and market power might now or in the future exist in Florida. The entry and presence of the Project is at worst neutral and at best dilutive of market power and market concentration problems that might otherwise exist in Florida. The Commission should keep in mind that Peninsular Florida is dominated by three investor-owned utilities that individually and collectively own a significant proportion of the installed generating capacity in Peninsular Florida. With regard to market concentration, Florida Power & Light Company ("FPL") controls more than 40% of Peninsular Florida's generation capacity. Two-thirds of Peninsular Florida's generation capability resides collectively in the hands of FPL, Florida Power Corporation, and Tampa Electric Company.

Q: What, if any, effect would the presence of merchant capacity have on potential price spikes due to short-term capacity shortfalls?

A: During the summer of 1998, we have witnessed the explosion of the wholesale energy market with spot prices reaching as high as $7,000/MWH. Prospects for spot prices this astronomical during peak lie at the heart of the issue of the market power issue. Can some key Florida player withhold capacity and drive up price during peak and thereby garner monopoly rents? The prospect for the existence and exercise of market power appears to be at least as large in Florida as it could be in other jurisdictions. To cite a contrasting example, ERCOT (which comprises the majority of Texas) has a peak demand of approximately 50,000 MW, and the majority of its indigenous generation is in the control of three investor-owned utilities just like Florida. However, ERCOT also has roughly 7,500 MW of generation capacity owned by cogenerators, industrial self-generators, and other entities not affiliated with retail-serving utilities. Of this 7,500 MW, nearly 3,000 MW is industrial self generation. Of the remaining 4,500 MW capacity, some 3,000 MW have historically been contracted to supply firm capacity and associated energy. The remaining 1,500 MW of capacity sells only as-available energy. This as-available energy represents a price buffer in the ERCOT system, one that restrains whatever market power might exist. It is significant to note that the price

explosions seen recently elsewhere in North America have not affected ERCOT. There is an argument to be made that the existence of a 7,500 MW merchant capacity "buffer" moderates within ERCOT the type of price flyup seen elsewhere.

It would seem to me that Florida would be well advised to encourage a "merchant fringe" to limit prospects for market power and price flyup. The New Smyrna Beach Power Project represents an effective start building such a "merchant fringe" for Florida. I emphasize, I am not arguing that there is or is not any effective market power enjoyed or exercised by any individual or collective entity in Florida. I have not done the analysis. Rather, I am simply arguing that the existence of a "merchant fringe" of generation capacity ensures against the existence or exercise of such market power. The existence of a "merchant fringe" is an insurance policy against market power and market concentration.

I should point out that a decrease in market power and market concentration normally manifests itself in terms of lower market prices (because of less restrictions in capacity and energy production) to Florida customers. Florida electric customers are the direct beneficiaries of whatever dilution of market power might occur as the result of the entry of the New Smyrna Beach Power Project.

Q: What, if any, economic benefits is the New Smyrna Beach Project likely to provide to the State of Florida and to Florida electric customers?

A: The analysis herein of the Florida and contiguous markets demonstrates that the Project and gas CC projects like it will provide direct economic benefits in the form of lower-cost electricity to Florida utilities than would otherwise occur and more profits to low cost producers than would otherwise occur.

Exhibit ____ (DMN-14) indicates how to quantify and think about the economic welfare benefits of the Project. The entry of the New Smyrna Beach Power Project shifts the original supply curve for Florida outward and to the right. In particular, the entry of the Project will move the supply curve from the leftmost supply curve in the figure to the rightmost supply curve in the figure. As this occurs, the market clearing price moves from the higher horizontal price line in the figure to the lower horizontal price line in the figure, and the quantity of electric energy consumed shifts from the leftmost vertical quantity line in the figure to the rightmost vertical quantity line. Price is depressed because of the increased capacity chasing a fixed demand, and quantity is stimulated because lower price attracts new customers and/or new uses. The shift from the upper left market clearing dot to the lower right market clearing dot in the exhibit makes both the price depression and the quantity

stimulation clear.

The figure quantifies the economic benefit that the consumers in Florida get because of the entry of the Project (the sum of areas A + B + C), which represents the price reduction that is enjoyed by existing customers (A + B) plus new customers (C). The figure further quantifies the economic benefit that the producers in Florida get because of the entry of the Project (areas E + F – A), which represents the increased profit from serving old customers at the new lower cost (E) plus the increased profit from serving new customers at the new lower cost (F) minus the profits that were formerly realized (before the entry of the Project) by running old plants to serve old customers. It is well known that the total economic benefit is the algebraic sum of the consumers plus producers surplus calculations, which is the shaded area in the figure (B + C + E + F).

I have not quantified all the individual areas in the exhibit, but it would not be difficult to do so. If electricity demand in Florida were rather inelastic (i.e., steep demand curve), the benefits to Florida consumers would be equal to the volume of production from the Project in each hour of the year in which it is economic times the price depression the entry of the Project induces in the Florida market. It is clear from the exhibit that there must and will be a reduction in the price in the Florida market because of the entry of any inframarginal capacity such as

the New Smyrna Beach Power Project. Florida consumers will not go empty handed because of the entry of the Project; some of the benefit of the entry will accrue to them through cost competition and market arbitrage. This is a critically important point. Entry of a new, merchant unit such as the New Smyrna Beach Power Project increases the quantity of capacity chasing the same market that would have been there with or without the new project. More supply chasing the same market necessarily means lower market price for a merchant producer. Merchant producers do not have the luxury of being able to impose their costs on downstream customers, and their entry therefore necessarily depresses market prices.

To summarize, as I mentioned previously, the existence of the New Smyrna Beach Power Project has the prospect of providing direct economic benefits in the form of a competitive check against market power and market concentration that a monopolistic or oligopolistic supplier might otherwise extract from its capacity and/or energy. The Project, like other gas CC projects, provides environmental benefits in the form of reduced environmental emissions that would otherwise occur if coal, steam turbines, or other baseload and/or peaking assets would have to be used instead.

Q: Will the Project result in primary fuel savings in Florida?

A: Yes. As shown in Exhibit ____ (DMN-7), the Project's

operation is expected to result in significant savings in the consumption of primary fuel that would otherwise be burned to generate electricity. These savings are projected to be between 13 Trillion Btu and 15.5 Trillion Btu per year over the Project's first ten years of operation. If the Project displaces generation from heavy-oil-fired units, the gross oil savings can be expected to be on the order of 6 million to 7 million barrels of oil per year. Even if it only displaces gas burned in less efficient units, savings will be substantial.

Q: Please describe and discuss any other benefits that the Project will provide.

A: As discussed in the testimony of Mr. Meling, the New Smyrna Beach Project will be a state-of-the-art, high-efficiency generating unit with low air emissions. While environmental economists and others may argue about the costs caused by air pollution, it is not seriously argued that pollution is cost-free. Thus, to the extent that the New Smyrna Beach Power Project produces power with less pollution than the generation it displaces, the Project reduces the external costs imposed on society in general (everyone who breathes and maintains property) due to electricity generation. The fact that it may be difficult to quantify such external costs in dollar terms does not diminish their real effects.

CONCLUSION

Q: Please summarize the key conclusions of your testimony.

A: 1. There is an immediate and growing need for much more than the 500 MW of electric generation capacity proposed by Duke New Smyrna and the UCNSB and for the electric energy it will produce over its life.

2. The gas CC configuration proposed by Duke New Smyrna and the UCNSB is the most cost-effective option to provide the needed Florida capacity and energy. It is better than gas simple cycle, coal, oil, or other technologies.

3. The New Smyrna Beach Power Project is definitely economically viable. Its cost is lower than the marginal unit in Florida in an increasing number of hours, it will generate profits for its owners, it will depress wholesale electricity prices in Florida relative to what they would otherwise be, and it will be very clean and environmentally benign. As a merchant facility, it will impose zero cost risks on Florida ratepayers and electricity customers.

4. At most, an inconsequential amount of energy from the Project would ever be sold out of state. The Project requires no out of state sales to be profitable and economically viable.

5. The Project will provide a number of important benefits to Florida ratepayers. It will increase energy supply, decreasing Florida energy prices relative to where they would otherwise be as a result. It imposes zero risk on Florida

ratepayers. Florida ratepayers will not be obliged to buy energy or capacity from the project unless it is cheaper than all competing alternatives (which it is in initially 69 percent of the hours of the year rising to 92 percent of the hours of the year). It will reduce environmental emissions relative to what otherwise would occur because it is based on a low heat rate gas combined cycle configuration. Finally, it will ameliorate any market power or market concentration issues that might be present in Florida, reducing ratepayer prices as it does so.

Q: Does this conclude your direct testimony?

A: Yes. The foregoing testimony, together with the referenced Exhibits, concludes my testimony.

BY MR. McGLOTHLIN (Continuing):

Q Doctor Nesbitt, have you prepared a summary of your testimony?

A Yes.

MR. GUYTON: Madam Chairman, may I take the witness on voir dire, please?

CHAIRMAN JOHNSON: Sure.

MR. GUYTON: I have concern about an exhibit in this witness's testimony and part of his testimony, and I think we would be well served to get that resolved before he testifies and perhaps relies on it because I intend to move to strike part of it.

CHAIRMAN JOHNSON: Okay.

MR. MOYLE: Madam Chair, I'm sorry to interrupt Mr. Guyton, but just so that my notes are clear. With respect to -- it was my suggestion about moving in a Composite Exhibit 16 which constituted all of the exhibits, as I understand it, that were filed along with the petition with the Commission. Mr. Guyton has said he has an objection to doing that. I was wondering whether we could identify what that objection is and then move everything in except the thing he objected to, unless he has a whole series of objections to that. It would help with my record keeping.

MR. GUYTON: We are about to address the portion

of Exhibit 16 with which we take issue as well as a portion of Mr. -- Doctor Nesbitt's testimony and exhibits through the voir dire.

CHAIRMAN JOHNSON: Okay.

MR. MOYLE: Is that the only thing then as to what you are about to do? In other words, you wouldn't have an objection --

MR. GUYTON: It's all I've identified right now, John.

VOIR DIRE EXAMINATION

BY MR. GUYTON:

Q Doctor Nesbitt, would you turn to page 8 of your testimony, please?

A Page 8?

Q Yes, sir.

A Okay, I'm on Page 8.

Q And there at Lines 4 through 14, you tell the Commission about the two models that you use to draw your conclusions in your testimony, don't you?

A Yes, my testimony describes the North American Regional Electric and the North American Regional Gas models, yes.

Q And then you provide more detailed descriptions of those two models in your DMN-15 and your DMN-16, correct?

A Yes, I do.

Q Would you turn to your DMN-7, please?

A I have it.

Q The column on DMN-7 entitled "Capacity Factor" --

A Yes.

Q -- that is not an output from your North American Regional Electricity model, is it, sir?

A That is derived from outputs from the North American Regional Electricity model based on a statistical fitting technique thereafter, so it is an output of that model.

Q Well, sir, let's be clear. Those capacity factors were not calculated in your model run from the North American Regional Electricity model, instead they were calculated from a third model, your operating model, correct?

A They were calculated based on outputs from the North American Regional Electricity model. They were calculated based on outputs from the North American Regional Electric Model.

Q And what model did you use to calculate those capacity factors?

A The model that was used was the operating model in the statistical fitting portion that I just alluded to thereof.

Q Now in your prefiled testimony, you've not described the operating model, have you?

A I don't believe the operating model was described in the prefiled testimony, no.

MR. McGLOTHLIN: Commissioners, I'm going to object to a continuation of this line of questioning. When Mr. Guyton said he wanted to voir dire the witness, I thought he had some questions about the witness's qualifications, but instead, it seems to be premature cross examination. The witness has not sponsored his direct testimony. Mr. Guyton will have an opportunity at that time to cross examine on the witness's exhibits.

CHAIRMAN JOHNSON: Mr. Guyton.

MR. GUYTON: Commissioner, I ask for a little leeway. I think it will become clear in a matter of minutes that we are going to see whether or not this witness has disclosed information which he should have disclosed. If we allow him to proceed with his summary and we wait until cross examination, this witness is going to make additional comments based upon evidence that we think is inappropriate. The only way to address that is through voir dire. The purpose of the voir dire is simply to show that it's inappropriate for him to be able to rely on some of these exhibits.

CHAIRMAN JOHNSON: Go ahead.

BY MR. GUYTON (Continuing):

Q Now in your operating model, you estimate the profitability and performance of an individual unit, create projections of operating hours, create price duration curves and profitability, correct?

A We have the capability to do that in the operating model, yes.

Q And one of the purposes of your DMN-7 is to quantify projected fuel displacement benefits of the Duke New Smyrna unit, isn't it?

A One of the purposes, indeed, is to calculate the degree of fuel displacement that occurs because of the Duke New Smyrna unit, yes.

Q Are your Exhibit DMN-7 and the operating model run from which the capacity factors on DMN-7 were developed, are they documents or analyses in which it is assumed that the project will displace oil fired generation?

A Could I get you to read the question back, please?

Q Yes, sir. Are DMN-7 and the operating model run from which the capacity factors on DMN-7 were developed, are those documents or analyses in which it is assumed that the project will displace oil fired generation?

A No.

Q Are DMN-7 and the operating model run from which the capacity factors on DMN-7 were developed, documents and analyses in which it is assumed that the project with its high heat rate of 6832 BTU per kilowatt hour will displace generation from less efficient gas fired steam boiler units or even from less efficient CTGs.

MR. McGLOTHLIN: Excuse me Mr. Guyton, did you say high heat rate?

MR. GUYTON: Yes.

MR. McGLOTHLIN: Object to the characterization.

MR. MOYLE: Madam Chairman, this sounds an awful lot like cross examination, Number 1. Number 2, if there is an error with respect to the exhibit and he's relying on it, I think the appropriate time to do that is during cross when you can attack his credibility. You know, it seems you've given him some additional leeway in time, and --

MR. McGLOTHLIN: I would second that, Madam Chairman. The witness is here ready to defend his exhibits and is ready to sponsor his testimony and defend cross examination, and Mr. Guyton has the cart way before the horse.

MR. GUYTON: Commissioner, I only have about three more questions.

MR. McGLOTHLIN: Well, that is three too many.

CHAIRMAN JOHNSON: Go ahead.

BY MR. GUYTON (Continuing):

Q Can we get a response to this? Are DMN-7 and the operating model run from which the capacity factors on DMN-7 were developed, are those documents and analyses in which it is assumed that the project with its high heat rate of 6832 BTU per kilowatt hour will displace generation from less efficient gas fired steam boiler units or even from less efficient CTGs?

A I'm having some difficulty answering that yes or no. Let me tell you what DMN-7 is, and maybe that will help you, Mr. Guyton. In table DM -- excuse me, in Exhibit DMN-7, if you refer to the third column, the capacity factor calculation that's summarized there is based on interplant and interregional competition around the entire United States, including but not limited to Florida and SERC. So Column 3 is not based on any assumption of any individual plant entering anywhere at any time. It's a full continental market equilibrium that gives us those numbers.

Armed with those numbers in Column 3, we've simply made a very simple calculation that is very apparent on this table. We have said how much primary energy savings would that imply of whatever type assuming the heat rates, i.e., the thermal efficiencies that are clearly articulated on the page. What if that were all oil and

what if that were all gas?

Q That assumes the heat rate for the Duke New Smyrna unit of 6832 BTU per kilowatt hour?

A That assumes a heat rate of the Duke New Smyrna under of 6832 BTUs per kilowatt hour, yes.

Q And this analysis shows displacement of generation from less efficient gas fired steam boiler units or even from less efficient CTGs, does it not?

A I'm sorry, I missed the question.

Q This exhibit shows displacement of generation by the Duke New Smyrna unit from less efficient gas fired steam boiler units or even from less efficient CTGs, does it not?

A Yes, it does.

Q Now are DMN-7 and the operating model run from which the capacity factors on DMN-7 were developed documents and analyses supporting the project's capacity factor ranging from 83% in 2002 to 94% or more in 2012?

A I'm not sure I understand what the question is.

Q All right. Is your DMN-7 and the underlying model run a document and an underlying analysis that supports the project's capacity factor running from approximately 83% in 2002 to 94% or more in 2012?

A Mr. Guyton, the analysis that supports the capacity factor is not exhibits DMN-7. It's the North

American Regional Electricity model and the subsequent operation of the operating model on the results thereof. DMN-7 is an illustration of what the answers from that model tell us about substitution of high heat rate inefficient capacity caused by the entry of low -- a heat rate highly efficient, Duke New Smyrna Beach like capacity.

Q Doctor Nesbitt, you or some of your associates at Altos assisted Duke New Smyrna in their response to Florida Power & Light Company's first request for production to Duke New Smyrna, did you not?

A I don't remember what the first request was right offhand.

Q You do recall providing some assistance to Duke New Smyrna in providing a response to a document production, don't you?

A I remember providing assistance to my attorneys.

Q All right, sir. I'm going to ask you to take a look, if you would --

CHAIRMAN JOHNSON: Mr. Guyton, how much more do you have because you are -- you are going into cross, and it may be more appropriate for you to handle this on a case by case basis as -- after he testifies because I don't see where you are getting anywhere either.

MR. McGLOTHLIN: I renew my objection.

CHAIRMAN JOHNSON: He is answering the questions accurately.

MR. McGLOTHLIN: I renew my objection and point out that you've given Mr. Guyton quite more latitude than he said he needed and we're not home yet, and this is simply inappropriate and prejudicial to the witness's opportunity to present his testimony.

MR. GUYTON: Madam Chairman, may I ask him simply to take a look at the first three requests and ask him if, indeed, the operating model run is not --

MR. McGLOTHLIN: Madam chairman, I object. You've given Mr. Guyton that opportunity before, and we are still working on it. I would like for a ruling on my objection.

CHAIRMAN JOHNSON: Mr. Guyton, I'm going to stop the line of questioning because I think we are going far beyond what voir dire is generally designed to accomplish. I was trying to, when you first stated what you were trying to achieve, I thought perhaps if you could achieve it expeditiously. Additionally, I believe his answers, even if you went through all of this -- well, I'm not going to tell you how I'm going to rule because it hasn't been moved yet, but I want to end the line of questioning. If you want to offer something at this point, go ahead and make the point, but I'm not going to allow us to spend any more

time through this process cross examining this witness.

MR. GUYTON: All right. I will go ahead and move it. Doctor Nesbitt's testimony is largely a blackbox, Commissioners. He tells -- he starts off by telling you that he has two models, and he gives you some detailed expression of what those models are. What he doesn't tell you is that he uses a third model, the operating model, and it's the only model in which he used to develop DMN-7, the run from it was. He used output from his North American Regional model as input to his operating model run; but the only model he used for this particular one was his operations model. We --

MR. McGLOTHLIN: Excuse me, I'm going to object, Mr. Guyton. Not only are we into cross examination, now we are making a motion and making oral argument before we have a chance to redirect. Not only has he not presented his direct testimony, we haven't had a chance to elicit responses to -- based on Mr. Guyton's question. We've got the cart before the horse again. I suggest the appropriate time to do this is at the conclusion of the testimony, after redirect and when I move the evidence.

MR. GUYTON: Commissioner, if we wait that long, the horse literally will be out of the barn. This witness will have testified relying on this, and I will have no hope of going back and identifying specific passages in his

testimony that are inappropriate and should be stricken. That's the reason that I asked to do this up front.

MR. McGLOTHLIN: I object to that argument occurring before I have a full opportunity for redirect on what has amounted to significant cross examination.

CHAIRMAN JOHNSON: And I understand the dilemma that you are in, but I don't think we are going to be able to cure that; and to the extent that there are objections made, if we need to strike, if we need to give you the opportunity to go back through and determine what needs to be stricken, we'll have to handle it in that manner.

MR. GUYTON: So I won't be allowed to proceed even to say what I have an objection to here?

CHAIRMAN JOHNSON: I think you did. Well, you need say what you have an objection to and not go through the testimony and the background information.

MR. GUYTON: We object to the admission of DMN-7 or any discussion of it, table 10 of the Joint Petition, the first full paragraph on Page 56 of the Joint Petition exhibit -- I'm sorry, I said Table 10 of the Joint Petition. I meant Table 10 of Exhibit 16, the Joint Petition exhibit. The paragraph at the bottom of Page 73 of the Joint Petition --

CHAIRMAN JOHNSON: I'm going to write down the things that you said. You said Table 10?

MR. GUYTON: Of the Joint Petition exhibit. The first full paragraph on Page 56 of the Joint Petition exhibit, the paragraph at the bottom of Page 73 of the Joint Petition exhibit and continuing on to the top of Page 74. We object to the insertion into the record of Page 28, Lines 2 through 10 of Doctor Nesbitt's prefiled direct testimony. And if you'll bear with me, I have one other passage I'm looking for where he relied on DMN-7. And the passage that begins at the bottom of Page 36, Line 25 through Page 37, Line 10.

CHAIRMAN JOHNSON: And you said 73, the last paragraph, 74 -- Was there --

MR. GUYTON: The paragraph continues between 73 and 74.

CHAIRMAN JOHNSON: Okay.

MR. GUYTON: Commissioners, I appreciate your indulgence. I thank you for the opportunity. We'll take the matter up further in cross, but that's the motion.

MR. McGLOTHLIN: Of course, Chairman Johnson --

CHAIRMAN JOHNSON: Let me be clear. I understand what you're objecting to at this point. I'm going to overrule that, but at the appropriate time, if you want to renew your objections as the issues are raised, I will entertain those arguments.

MR. GUYTON: Thank you.

MR. McGLOTHLIN: Of course, we had no prior notice of the objection and motion, Chairman Johnson, so we'll have to use a break to see exactly what the scope of it is and we'll respond at the appropriate time.

I do have one more house cleaning matter, if you'll allow me.

BY MR. McGLOTHLIN (Continuing):

Q Doctor Nesbitt, I think you indicated that you had a correction on some exhibits as well. Would you identify those at this time?

A Yes, I'd like to. Thank you very much. DMN-5 and 6 were corrected and resubmitted late following my deposition. I believe, Mr. McGlothlin, you have corrected and distribute copies of those. I would like to substitute those for what was in the original direct testimony.

And then in DMN Number 15, there are a number of references to 30 regions in the Altos North American Regional model. There are actually 32. Please make note of that and substitute that every time that's in there, and that concludes it.

MR. McGLOTHLIN: Commissioners, I've distributed the revised DMN-5 and 6 to the parties, and I have copies for you at this time. We also distributed a handout of some bullet points and some visuals taken from -- distilled from and taken from the prefiled direct as an outline and

visual aid for the summary. The parties have also received this earlier today.

BY MR. McGLOTHLIN (Continuing):

Q Doctor Nesbitt, would you proceed to provide your summary, please?

A Yes. Beginning on Page 1 we can see that the title here is the need for and the viability of the Duke New Smyrna Beach project. Flipping over to Page 2, I'd like to start out with the key conclusion, really the key reality; and that is, that the Duke New Smyrna Beach -- and I'm going to abbreviate that throughout the remainder of this package, DNSB; and if I mispronounce it, it's because I don't read acronyms all that well -- project is needed now. Now. And it's economically viable now.

And what I want to talk about a little bit is the methodology that my colleagues and I at Altos have used to demonstrate that, and that's the model or models, the data that supports those models and the analysis that follows from those models, and I think paints a clear picture of the economic viability of this project.

If we flip to Page Number 3, this is a picture from my prefiled testimony of the model, and it indicates that the philosophy that we've used here embodies an approach that we want to -- we want to consider Florida not as an island in and of itself but is independently

interconnected prospectively to the rest of North America.

Okay, what we want to do is look at supply, demand, transportation, entry, operation, and exit in each of those 32 regions that's articulated there. We want to lay out prospective and existing transmission between and among every contiguous pair of regions. We want to look at generation and consumption and in-bound transmission and out-bound transmission within every region; and that's, indeed, what we have done.

If we flip over to Page Number 4, I think it's important to point out in a little bit of detail how that's been done here. Let me point you to the circle in the middle that's called "indigenous generation." What "indigenous generation" simply means is generation in any of the given regions in the model on the previous page. In this case, let's say Florida.

Now the model, as it's laid out here, does the kind of simulations that I believe Commissioner Jacobs talked about yesterday, ascending cost dispatch. You lay the plants out in ascending order of cost, so have an existing mix of capacity that will, indeed, run right on up the capacity -- or the energy supply curve until you get to demand, and then it will stop running up. So in many regards, for existing capacity it's no different from the utility planning methods that I've seen over the last two

decades, the Pro Mods, the Henwoods (phonetics), the rather standard planning techniques. I don't want you to be confused and say, oh, this is just a free market merchant model because it's not. It simulates the world you have here. It also simulates, in an important sense, the FERC 888 world as well.

In indigenous generation we've gone through a lot of pain and I think got a lot of success at putting in investment. How many new plants will the market bring in? And it will bring them in until they are no longer profitable to bring them in, and then it will stop; that's what the model does. And I think in an important sense that responds to a number of questions that were raised yesterday from the various commissioners. It also retires or stops running plants. It idles plants that are not economic and not competitive.

Okay, important, indigenous consumption is represented in each region at the other left. Fuel substitution is represented at the bottom, and it's represented in the most aggressive possible way so that we can have the most conservative estimate -- credible estimate that we can think of for fuel price relative to power price in each of the regions. We don't want to inadvertently have too optimistic or too wide a spread between those prices.

And then finally, importantly, we represent intercourse between the various regions, and this is articulated in great detail in DMN-15.

Moving on quickly to Page Number 35, we've worked equally assiduously to represent natural gas price by supply basin, by existing and prospective transmission link, and by demand region throughout North America. Why have we done this? We want to have a consistent and proper and correct representation of gas price and basis differential so that we don't overstate or understate things inadvertently.

Moving to Page Number 6, when you boil it down, there is a picture of the methodology. Supply demand balancing, market clearing, fair market value of every commodity at every point in North America; that's the basic assumption. Note in this simple diagram there is a price there. Every plant is a little tiny piece of that supply function. Every plant sees and gets the same price. The plant runs when its production cost is lower than the price. The plant doesn't run when its production cost is above the price; it's idle.

Moving to Number 7, and I'm talking about the key results. It's very important, number 1, the Duke New Smyrna Beach project because there's -- or excuse me, there is a direct and an immediate economic need. The project

displaces generation from high cost plants that would otherwise have to be maintained -- if you want to run them, you have to maintain them -- and run; and it displaces them with a newer, lower cost, cleaner plant. Duke New Smyrna Beach project is a high efficiency lower cost plant than what it displaces, very important.

Corollary to that, Florida ratepayers' need, the lower prices that are going to result from the entry of that plant; and lower prices will result from the entry of that plant. We will see why in a minute.

Now displacement of high cost plants by low cost plants, so what? Well, it's not so what. As indicated in my testimony on Page 35, Line 14, it creates what economists call producers plus consumer surplus. Okay, in the lexicon we heard yesterday, this is economic wealth. This is GDP for the State of Florida. This is investment. This is jobs. This is manna from heaven.

COMMISSIONER GARCIA: What about the stranded investment.

DOCTOR NESBITT: Can I defer that for a minute? I have plenty to say about that.

COMMISSIONER GARCIA: Sure.

DOCTOR NESBITT: Page Number 8 -- Actually let me not defer that, Commissioner Garcia, I would like to address that; and that was why I emphasized the word

"maintained," if we go back to the first item.

There is a lot of -- a lot of fixed O&M costs that you have to plow into a plant to keep it alive, okay? So if we look at one of these high cost units, I pointed out in any testimony, a 1972 Chevrolet Vega. Anybody still drive one of those? Do you drive one of those? I don't drive one of those. But they do have a high O&M cost. Okay, it would cost you a lot of money to maintain it, just to keep it in your garage if you didn't drive it. That cost is totally avoidable if you don't run the plant. That is not a stranded cost.

Ongoing maintenance cost to keep a plant alive is not rate-based cost. There is no entitlement to run it. That's cost that's strictly avoidable by introducing efficient, new high heat rate, low cost plants. How much is left on the books? How much is truly sunk, truly embedded, return of and return on rate base in these old plants? I don't know the answer to that. My conjecture is not much. My conjecture is that the plants you are going to see displaced out Florida plants you want to see displaced. The embedded costs are very low, and the go-forward maintenance costs of those 1972 Chevy Vegas is very high; you want them out. And as you take them out, you create wealth for the citizens of Florida; and you create low prices unilaterally for the citizens of

Florida.

Sir, does that answer the question?

COMMISSIONER GARCIA: Pretty much.

A Okay, moving over to page number 8, one of the points that's very important to make here is that the Duke New Smyrna Beach project doesn't have to beat the next competitive entrant; it has to beat the last dog in the stack. It's not a race against prospective new entrants that matters. It's a race between the brand new plant, the Duke New Smyrna Beach plant and the last plant out on the stack, the highest cost plant out there. And it's the cost differential between the first plant in, the Duke New Smyrna Beach plant, the one with the low heat rate and the low O&M cost, and the first plant out, which is the one with the high O&M cost and typically the lousy heat rate that sets the benefits. Benefits are high. They are irrefutable. The last cost -- the last plant in the Florida stack is a very expensive plant, and I would agree with Mr. Green that the first plant into the stack is a very low cost plant, that's the Duke New Smyrna Beach plant. So it's very important that you understand, very important. The benefits are set by the difference between DNSB and the marginal unit that is displaced. And displaced doesn't mean shut down; it means you don't have to run it as much or it's shut down.

Okay, the other thing, and we are going to show this on a diagram in a minute, is Point Number 3. When Duke New Smyrna Beach enters, wholesale energy prices in Florida are directly reduced as the set of such entry, directly reduced as a causal relationship. How do you know this? I grew up in Nevada. We are pretty dumb out in Nevada. We know when there are more cows put in the stock yard, the price of beef goes down. When there's more plants put into the supply stack, the price of power has to go down. You've got more supply chasing a fixed demand.

Okay. So if you put 500 megawatts, admittedly not a lot of incremental supply into the Florida market, the price of power in Florida has to go down. What does that mean? That means by allowing Duke New Smyrna Beach to go forward you've reduced the price to every consumer in Florida; price signals proliferate throughout Florida.

Let's look at Page Number 9.

COMMISSIONER DEASON: Let me ask a question on your beef analogy there.

DOCTOR NESBITT: Certainly.

COMMISSIONER DEASON: It may very well happen in Nevada, I certainly don't know, but is there a commission in Nevada that determines the number of cows needed in Nevada and then says who can grow that number of cows?

DOCTOR NESBITT: Not that I know of, Commissioner

Deason.

COMMISSIONER DEASON: Okay.

DOCTOR NESBITT: That's not the point though. The point I wanted to make, and it's a good question, is when you introduce one more unit of supply into a fixed market, price has to go down, so everybody has to benefit because electricity may move at the speed of light, but price certainly moves at the speed of light in the lexicon. More supply chasing fixed demand means lower price. It means better price, better electric price in the wholesale markets in Florida.

Let me skip over Page Number 9 and go to -- well, let me not skip over Page Number 9.

Page Number 9 which is taken from my direct testimony is a picture of the supply stack in the State of California. A lot of people say, oh, California has a big problem. Well, the supply stack in California as you're about to see doesn't look too different from the supply stack in the State of Florida. Why? Well, the supply stack in the State of California has a whole bunch of must-run units, and hydro and NUGs and IPPs that are sitting out to the left, 20 thousand megawatts worth. And you move up to nukes, and then you move up to some coals, a tiny bit of gas combined cycle in California, and an extremely wide traunch of relatively high cost capacity:

Old steam turbines in California that are all gas.

If you flip over to the next page, which is the supply stack for Florida my colleagues and I have put together, a very similar qualitative picture, and we've --

COMMISSIONER GARCIA: Explain your California, what you were trying to get at with your California. I didn't -- I wasn't listening, I'm sorry.

DOCTOR NESBITT: Okay, what I'm trying to get out of that is simply this notion that you have some fairly low cost capacity, fairly low cost energy at the left and then you get up on a long traunch, 20 gigawatts, 20 thousand megawatts of relatively much more costly steam turbine capacity. Demand is almost always out on that flat traunch. Most of the hours of the year demand is over there on that big flat traunch, so you don't see a lot of volatility in price during those hours. So you lull yourself into a set of complacency if you're a Californian, hey, I've got a good deal going here. You don't have a good deal going here in California. Because if you put a lot of gas combined cycle units in there and push that whole supply stack out to the right, you've reduced that large traunch and reduced the volatility, or at least left the volatility the same, very similar situation here in Florida as you see by the next picture.

(Whereupon, the transcript continues in sequence

in Volume 6)

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