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TAMPA ELECTRIC

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 07_____-EI
IN RE: TAMPA ELECTRIC'S
PETITION TO DETERMINE NEED FOR
POLK POWER PLANT UNIT 6

TESTIMONY AND EXHIBIT
OF
PAUL L. CARPINONE

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

PREPARED DIRECT TESTIMONY ORIGINAL

OF

PAUL L. CARPINONE

Q. Please state your name, business address, occupation and employer.

A. My name is Paul L. Carpinone. My business address is 702 North Franklin Street, Tampa, Florida 33602. I am employed by Tampa Electric Company ("Tampa Electric" or "company") as Director, Environmental Health & Safety in the Environmental Health and Safety Department.

Q. Please provide a brief outline of your educational background and business experience.

A. I received a Bachelor of Science degree in Water Resources Engineering Technology from the Pennsylvania State University in 1978. I have been a Registered Professional Engineer in the State of Florida since 1984. Prior to joining Tampa Electric I worked for Seminole Electric Cooperative as a Civil Engineer in various positions and in environmental consulting. In February 1988, I joined Tampa Electric as a Principal

Engineer, and I have primarily worked in the area of Environmental Health & Safety. In 2006, I became Director, Environmental Health and Safety. My responsibilities include the development and administration of the company's environmental, health and safety policies and goals. I am also responsible for ensuring resources, procedures and programs meet or exceed compliance with applicable environmental, health and safety requirements, and that rules and policies are in place and functioning appropriately and consistently throughout the company.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to demonstrate, from an environmental perspective, the benefits of the proposed IGCC Polk Unit 6 project over other coal technology alternatives Tampa Electric considered. I will describe the environmental requirements and permits necessary to comply with existing regulation. I will explain why the selection of IGCC technology is the best alternative to ensure the company meets or surpasses environmental requirements on emissions over other coal technologies. Finally, I will discuss other potentially viable benefits with IGCC technology such as carbon capture and

sequestration and other potential impacts associated with new legislation related to carbon dioxide ("CO_2").

Q. Have you prepared an exhibit to support your testimony?

A. Yes, Exhibit No. _____ (PLC-1) was prepared under my direction and supervision. It consists of the following documents:

Document No. 1	IGCC and Pulverized Coal Air Emissions Comparisons
Document No. 2	Emissions of Recently Proposed Projects in Florida

Q. Are you sponsoring any sections of Tampa Electric's Determination of Need Study for Electrical Power: Polk Unit 6 ("Need Study")?

A. Yes. I sponsor sections of the Need Study entitled "Environmental". Specifically, I sponsor sections III.D "Environmental" and VII.C. "Environmental".

ENVIRONMENTAL APPROVALS AND REQUIREMENTS

Q. What type of permits will be required for Polk Unit 6?

A. Polk Unit 6 will be required to obtain federal, state,

and regional environmental approvals and permits. The principal approval is Certification under Florida's Electrical Power Plant Siting Act ("PPSA"). This will be a comprehensive review of all environmental aspects of Polk Unit 6, coordinated through the Florida Department of Environmental Protection ("FDEP") and involving all state and regional agencies with environmental responsibility and those potentially affected by Polk Unit 6. Polk Unit 6 will also require federal and federally delegated permits including approval by the U.S. Army Corp of Engineers for impacts to wetlands, Prevention of Significant Deterioration/Air Construction Permit by the FDEP, National Pollutant Discharge Elimination System Permit, and an Underground Injection Control Permit from FDEP.

Q. What is the schedule for filing the required environmental permits?

A. The Site Certification Application will be filed with the FDEP in August 2007. Tampa Electric has engaged the services of an environmental consultant to prepare air modeling studies and other evaluations, as well as prepare the permit application documents.

Q. What general features of the Polk Station site serve to meet existing or potential environmental requirements?

A. The Polk Station site was selected because of the advantages of using the existing site and infrastructure. The existing site provides the needed infrastructure and minimizes environmental impacts. The Polk Station site includes sufficient land area, which has been previously certified in accordance with the PPSA. Water use will be minimized by using excess storm water from on-site collection, maximizing the reuse of existing industrial wastewater, and using water from the Upper Floridan Aquifer. Water will be recycled as much as possible and released using underground injection control wells. Polk Unit 6 is being designed to minimize water discharges to surface waters or groundwater that could potentially affect the environment. Byproducts will be recycled to the greatest extent practicable. Byproducts that cannot be recycled will be placed in an approved disposal facility designed and permitted to have minimal impacts to the environment.

COMPLIANCE STRATEGY

Q. Does IGCC technology minimize air emissions?

A. Yes. As described by witness Mark J. Hornick, the IGCC technology minimizes emissions more effectively than other coal technologies by optimizing the systems used to remove pollutants and optimizing the amount of power produced per unit of fuel. Unlike other coal generation technologies, IGCC allows for efficient removal of most pollutants before the combustion process when the volume of the gas to be treated is substantially smaller than it is after combustion. As witness Hornick further described, sulfur oxides are minimized by removing sulfur compounds from the synthesis gas fuel stream using an effective chemical separation process that results in production of a marketable sulfur product. The smaller gas stream also allows for economical removal of particulate matter emissions using intensive liquid scrubbing and traditional gas filtration methods. In addition, although it is not currently a regulatory requirement, it is technically feasible to modify this chemical separation process to allow removal of CO_2.

Polk Unit 6 will be configured to provide the highest level of mercury removal using an activated carbon filter. The technology will include combustion controls to minimize formation of nitrogen oxides, carbon monoxide and volatile organic compounds. Selective Catalytic

Reduction will be implemented for further reduction of nitrogen oxides emissions.

Q. Will the emission rates of mercury from Polk Unit 6 meet or be less than regulatory standards?

A. The emission rates of mercury from Polk Unit 6 will be less than the latest and most stringent mercury emission standard recently established for IGCC plants by the environmental protection agency ("EPA"). Tampa Electric expects Polk Unit 6 to achieve a 90 percent removal efficiency. Mercury emissions are primarily a function of the amount of mercury contained in the fuel burned and therefore will vary accordingly.

Q. How do the emissions of Polk Unit 6 compare to those from units using alternative coal generation technologies?

A. As reflected in Document No. 1 of my Exhibit No.___(PLC-1), a comparison between various coal generation technologies developed by the EPA demonstrates the most effective coal generation technology for removal of the aforementioned constituents is IGCC.

As described in the testimony of witness Hornick, the

IGCC process uniquely allows use of the efficient combined cycle system, which optimizes the power output per unit of fuel input or heat rate. By recovering waste heat from the synthesis gas production and the combustion process and converting it to power output, more power can be produced with fewer emissions.

Q. How do the air emission rates for Polk Unit 6 compare with recently proposed generation projects such as Florida Power & Light's Glades Power Park, Seminole Electric's Unit 3 and Taylor County's Energy Center?

A. As previously stated, Polk Unit 6 will have lower emissions than other coal-fired technologies. Document No. 2 in my Exhibit No. ____ (PLC-1) shows emissions comparisons of the most recently proposed projects in the state of Florida based on permit applications and proposed data. As illustrated, Polk Unit 6 will have lower nitrogen oxides, sulfur dioxide, particulate matter, and comparable mercury emissions to those of other recently proposed coal projects in Florida.

Q. How will the emission rates proposed for Polk Unit 6 affect air quality?

A. The emission rates will only minimally affect Florida's air quality. Polk County and the entire air shed associated with Polk Unit 6 are classified as in attainment with all National Ambient Air Quality Standards. The emissions as a result of Polk Unit 6 are not expected to change the attainment status of the area.

OTHER ENVIRONMENTAL CONSIDERATIONS

Q. What is the Tampa Electric's position related to greenhouse gas emissions such as CO_2?

A. The company's position is that, several key elements should be the foundation of any legislative plan addressing greenhouse gases, including:

- Ensure greenhouse gas policy is applied economy-wide to all industries;
- Encourage technology development to address reductions with tax incentives;
- Give credit for early action for steps taken by companies, like Tampa Electric, prior to any mandated CO_2 reduction program;
- Support a realistic time frame for addressing climate change that maintains fuel diversity, and supports advanced clean coal technology; and
- Ensure that any greenhouse gas initiative that is

implemented does not economically disadvantage the United States.

Q. How will Polk Unit 6 be positioned to comply with any potential CO_2 emissions legislation?

A. Polk Unit 6 is well-positioned to comply with potential CO_2 legislation because the IGCC process is uniquely conducive to removing CO_2 in the most efficient manner. One of the most significant factors in making meaningful progress towards this legislation is through carbon capture and sequestration. Although there are uncertainties regarding the technical feasibility of sequestering CO_2 of the magnitude necessary, components of the IGCC technology for CO_2 removal have been commercially demonstrated. Tampa Electric has worked with the University of South Florida to evaluate the geologic storage of CO_2 beneath the Polk Station. The study identified a deep saline aquifer with an appropriate confining layer above it that appears capable of storing large quantities of CO_2. Though additional work must occur to fully assess the feasibility, Polk Unit 6 has the best opportunity that we know of today to meet the growth in demand for electricity and the potential legislative goals for CO_2 emissions reduction.

Witnesses William A. Smotherman, Mark J. Hornick and Michael R. Rivers address the technology's capability of CO_2 capture and sequestration in more detail.

Q. How could potential CO_2 legislation impact Polk Unit 6?

A. Various types of mandates on CO_2 have been proposed as part of legislation addressing CO_2 and other greenhouse gases. Two of the most widely discussed approaches are a cap-and-trade program and a tax on the amount of CO_2 emitted. While it is not known what CO_2 emission policy, if any, would ultimately be implemented, Tampa Electric believes that a cap-and-trade scenario would be more likely than a tax scenario. Assuming that cap-and-trade legislation is enacted and implemented by 2013, Tampa Electric has analyzed several scenarios with the impacts of future carbon emission price policies. The economic results of those analyses are included in the testimony of witness William A. Smotherman.

It is anticipated that IGCC technology is the best choice to reduce CO_2 emissions that may be required by future CO_2 regulations. The capabilities of IGCC technology at Polk Unit 6 to remove and sequester carbon are discussed in the testimony of witness Mark J. Hornick.

Q. Since there are no environmental regulations concerning CO_2 capture today, how will Polk Unit 6 be designed should future regulations occur either during construction or post-construction?

A. Polk Unit 6 will be specifically designed to allow for space to include carbon capture equipment to be installed once any legislation is enacted. Additionally, the technology selected allows for the most efficient removal of CO_2 since it is captured prior to combustion. Witness Rivers addresses the design characteristics in more detail.

Q. Please summarize your testimony.

A. Polk Unit 6 utilizes a proven technology that will not only meet, but will likely surpass existing environmental regulatory requirements. The selection of IGCC over other coal technology alternatives will minimize emissions while simultaneously providing cost-effective and reliable energy. As a result of the pollution control equipment and engineering control measures that will be included in the design of Polk Unit 6, it is anticipated that the facility will surpass the latest EPA requirements on emissions. It is the state of the art

design features that will make Polk Unit 6 one of the cleanest of the coal generation technologies recently proposed in the state of Florida. Finally, because of this unique combustion process for Polk Unit 6, it is well-positioned to address any potential environmental regulatory uncertainties such as CO_2 legislation.

Q. Does this conclude your testimony?

A. Yes, it does.

IGCC and Pulverized Coal (PC) Air Emissions Comparisons

Parameter	Bituminous Coal			
	IGCC Slurry Feed Gasifier	Sub-critical PC	Super-critical PC	Ultra Super-critical PC
NO_x (as NO_2) [1] (lb/MMBtu)	0.043	0.056	0.056	0.055
SO_2 [2] (lb/MMBtu)	0.038	0.080	0.080	0.079
PM [3] (lb/MMBtu)	0.006	0.011	0.011	0.011
Mercury [4] (lb/yr)	24.1	29.3	27.4	24.5

Source: Environmental Footprints and Costs of Coal-Based Integrated Combine Cycle and Pulverized Coal Technologies, U.S. Environmental Protection Agency, EPA-430/R-06/006, July 2006.

Note: Lb/MMBtu and lb/yr values calculated from EPA's lb/MWH and heat rate data.

[1] The NO_X emission comparisons are based on emission levels expressed in ppmvd at 15% oxygen for IGCC and lb/MMBtu for PC.

[2] SO_2 removal efficiency basis is 98% for PC. Removal efficiency basis for IGCC is 99%.

[3] Particulate removal is 99.9% or greater for the IGCC, 99.8% for bituminous coal and 99.7% for sub-bituminous.

[4] Mercury emission rates are based on the premise that mercury-specific controls are installed and operate at 90% efficiency.

Emissions of Recently Proposed Projects in Florida

Parameter	Polk 6 w/ SCR	Seminole Unit 3 (proposed)	Taylor Energy Center (proposed)	FP&L Glades (proposed)[1]
NO_x (lb/MMBtu)	0.038	0.07	0.05	0.05 [2]
SO_2 (lb/MMBtu)	0.019	0.165	0.04	0.04
PM (lb/MMBtu)	0.007	0.015	0.013	0.013
Mercury (lb/yr)	48	46	58	180

[1] Proposed as of May 2007
[2] Glades NO_x limit is proposed on a 30-day rolling average basis