BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 20240001-EI - Fuel and purchased power cost recovery clause with generating performance incentive factor.

WITNESS: Direct Testimony of Tom Ballinger appearing on behalf of the Staff of the Florida Public Service Commission

DATE FILED: February 5, 2024

Q. Please state your name and title.

A. My name is Thomas Ballinger and I am the Director of the Division of Engineering for the Florida Public Service Commission (Commission).

Q. Please describe your education and professional experience.

A. I graduated with a B.S. degree in Mechanical Engineering from the Florida State University/FAMU College of Engineering in April, 1985. Since June of that year, I have been employed with the Commission, primarily in the area of electric utility system planning and reliability. What began as an entry level engineering position has evolved into a career spanning over three decades. Throughout this time, I have been involved with significant technical and policy issues that face the electric industry such as open access to retail sales, promotion of renewable energy generation and energy conservation programs, and storm hardening efforts. During my career, I have had the opportunity to provide testimony and technical recommendations before the Commission, the Federal Energy Regulatory Commission, and have also made presentations before the Florida Legislature. The last 29 years of my career have been in managerial positions within the Commission. I was promoted to my current position in 2012 which entails directing a technical staff of 39 positions in the area of electric utility planning, water and wastewater engineering issues, and the Commission's electric and gas safety programs.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide the Commission with an independent evaluation of Florida Power & Light Company’s (FPL) nuclear plant outages that occurred between 2020 and 2022 and to provide recommendations regarding the recovery of replacement fuel costs associated with such outages.

Q. What is meant by replacement fuel costs?

A. Utility personnel operate their generation units using automatic controls that continuously adjust unit outputs, start-ups, and shut-downs based on economic dispatch. In other words, utilities are constantly making changes to generators to ensure that the least cost generation is being utilized. Whenever a unit trips off line, other units in the system must pick up the slack, typically at a higher cost, until the unit returns to service. The cost of this replacement energy is known as replacement fuel costs.

Q. How do utilities recover replacement fuel costs?

A. Power plant outages occur almost daily and the actual costs incurred for fuel and purchased power are included in a utility's filings in the fuel clause. If a particular outage is at issue in the fuel clause, then the utility must model what the system costs would have been had the unit been available for service. The difference between the actual and the modeled costs is what can be refunded to customers.

Q. Do you agree with the methodology used by FPL to estimate replacement fuel costs for all of the outages in this proceeding?

A. Yes I do. FPL used a weighted average of actual fuel costs, other than nuclear, for the period of time associated with each particular outage to calculate an estimated system fuel cost. FPL then subtracted what the estimated cost of equivalent nuclear power would have been and the difference is the net replacement fuel costs. While not perfect, this method provides a reasonable estimate of what additional fuel costs were incurred as a result of the outage without having to recreate hourly loads and run economic dispatch models.

Q. What factors should be considered when deciding whether to allow cost recovery?

A. As with any regulatory review, the Commission should review the actions

leading up to the outage and determine if utility personnel acted in a prudent manner based on the information that was known, or reasonably should have been known, at the time. For example: Was the employee(s) involved adequately trained? Were written procedures followed? Was there adequate oversight of employees or outside contractors? Was the equipment involved adequately maintained and operated according to procedures and protocols?

Q. Did you review FPL witness Gebbie's direct testimony?

A. Yes I did and I agree with many of his analyses and statements regarding causal evaluations. However, I will primarily refer to witness DeBoer's testimony and other exhibits when I address particular outages.

The provision of adequate and reliable electricity is essential to our society's health and welfare. Witness Gebbie's statement that "[t]he U.S. nuclear power plant industry is said to 'aim for perfection but settle for excellence'" is something the Commission should expect from all Florida utilities, not just ones with nuclear power. In order to achieve excellence in any profession, you must have open communication, competency, and accountability. Like a three-legged stool, if one of these components is missing, then the goal of excellence will never be achieved. The after-the-fact review processes discussed by witness Gebbie on pages 5 through 7 of his testimony are critical and should continue even if the results identify management shortcomings. That is the ultimate purpose of any review process, to identify areas for improvement and to ensure the issue or behavior does not happen again.

Q. Did you review the Commission Staff's operational audit report entitled Review of Nuclear Operations, Florida Power & Light Company, dated January, 2024?

A. Yes I did.

Q. Did this report identify any outages that are the subject of this proceeding?

A. The staff who prepared the audit identified eight forced outage events involving various problematic issues. One of the eight, the 2017 outage at St. Lucie Unit 2, is outside of the review timeframe for this proceeding. It is my understanding that another outage, the August 19, 2020 outage at Turkey Point Unit 3, has already had the replacement fuel costs returned to customers so it is not at issue in this proceeding. The remaining six outages are discussed in witness DeBoer's direct testimony.

Q. Did you review witness DeBoer's direct testimony and exhibits?

A. Yes I did. The issues carried forward for this docket are basically a review of FPL's nuclear outages for calendar years 2020, 2021, and 2022. Witness DeBoer identified and discussed two outages for 2020, seven outages for 2021, and one outage for 2022.

Q. What outages did you review in preparation for this proceeding?

A. I reviewed all the outages discussed by Witness DeBoer as well as one additional outage in 2021 and seven additional outages in 2022 for a total of 18 outages. I have attached to my testimony Exhibit (TEB-1) which is a summary table of the outages I reviewed in preparation for this proceeding.

Q. What are your recommendations to the Commission?

A.Of the ten outages discussed by witness DeBoer, I am recommending that FPL refund the replacement power costs for three of the outages; the July 2020 outage at Turkey Point 4 ($1,453,970), the December 2021 outage at St. Lucie 1 ($1,434,048), and the January 2022 outage at St. Lucie Unit 2 ($8,693,593). These outages are discussed in detail below. I am not recommending any adjustments pertaining to the remaining seven outages discussed by witness DeBoer or the additional eight outages

that staff reviewed.

July 2020 Turkey Point Unit 4 Outage

Q. What is your understanding as to the cause(s) of this outage?

A. Based on the Root Cause Evaluation (RCE) provided by FPL, this outage appears to have been caused by the age of the exciter stator winding combined with the intrusion of water. According to the RCE, neither of these factors in isolation would have caused the outage.

The timeline provided with the RCE states that on September 9, 2019, FPL conducted an assessment of its nuclear unit exciter windings following notification of a failure at another nuclear plant, the H.B. Robinson plant located in Hartsfield, South Carolina. The assessment recommended rewinding the exciter rotating and stationary windings based upon the age of the components. On December 4, 2019, FPL initiated the process to rewind both rotating and stationary exciter windings at Turkey Point Units 3 & 4 for the next refueling outage. Therefore, prior to the outage that occurred on July 5, 2020, FPL was aware of, and appears to have taken actions to address, the age of the exciter windings.

The water intrusion has been a long time problem. According to the timeline provided by FPL, this has been identified for several FPL units with outdoor generating facilities since 1998. In 2008, FPL adopted revisions to its installation procedure, 0-GMM-090.1, to include FPL supervisory verification of the installation of specific sizes and types of weatherization materials for the exciter enclosure installation procedures. The RCE states that:

> [T]he PTN subject matter expert for the Generator/Exciter equipment developed a weather sealing detail for the Exciter housing that replaced the standard ¼" thick inner rubber gasket with a ½" thick foam gasket

> to ensure proper compression between the housing and the Turbine Deck curb. This site specific seal was developed due to previous water intrusion events that demonstrated the standard ¼" thick inner rubber gasket did not provide a sufficient seal between the Exciter housing and Turbine Deck curb. The inner foam gasket was incorporated into procedure 0-GMM-090.1 "*Exciter Removal, Inspection, and Installation"* but was not included in OEM procedures.

(Page 9 of RCE, Bates stamp FCR-22-003431)

This omission is later referred to as a "latent error" in the RCE. Since 2008, the Original Equipment Manufacturer (OEM) vendor Siemens apparently performed the required exciter testing and maintenance many times prior to, and including, the latest testing on March 21, 2019. At that time, several seals were found hard and torn and degraded seals were replaced. Siemens concluded the equipment was acceptable for return to service. However, the RCE states:

> Of particular concern was the housing floor gaskets which were found dislodged in sections around the perimeter of the PMG compartment. These floor gaskets did not meet the site-specific design which uses an inner ½" thick foam seal. Instead, the standard ¼" thick rubber inner gasket was applied. Additionally, the site-specific vertical foam weather seal designed under MSP02-055 and required in site procedure 0-GMM-090.1 was not installed.

(Pages 9 & 10 of RCE, Bates stamp FCR-22-003431 through 003432)

Q. What do these facts provided by FPL suggest to you?

A. These facts are troubling for two reasons. First, I find it troubling that a utility would identify a problem, design a fix, but then not implement the solution for many

years. Such behavior is far from pursuing excellent performance. Second, FPL has provided no documentation showing that FPL signed off on the last Exciter housing installation and has provided no explanation as to how outdated weatherization sizes and materials were provided to the vendor. In my opinion, FPL management failed to follow up with its own employees to ensure that the design fixes were incorporated and FPL management failed to provide proper oversight of its OEM vendor to ensure that these procedures were followed. For these reasons, I would recommend to the Commission that the replacement power costs of $1,453,970 plus interest be refunded to FPL's customers.

December 2021 St. Lucie Unit 1 Outage

Q. What is your understanding as to the cause(s) of this outage?

A. FPL utilizes groups of employees known as Fix It Now (FIN) teams which are deployed throughout FPL's nuclear fleet to perform routine maintenance and repairs. Based on the testimony of Witness DeBoer, a technician who is part of a FIN team was replacing a pressure differential indicating switch (PDIS). During this process, the technician inadvertently contacted a live wire to the surrounding enclosure causing a blown fuse which resulted in a loss of steam generator feed flow. The unit was then manually tripped off-line. Witness Gebbie describes this outage as being caused by a properly trained FPL supervisor not enforcing the use of human error reduction tools with his technicians. My understanding of the term human error reduction tools would refer to the use of items such as rubber mats or gloves and insulating straps on hand tools. Such practices are common in many maintenance procedures and are in place to eliminate both personnel and equipment safety risks. So apparently, both witnesses focus on the technician's failure to isolate the area electrically when working with live wires.

However, according to the RCE provided by FPL, the root cause was the FIN Supervisor choosing to deviate from the FIN work management process and failing to validate authorization to perform the work. A contributing cause was that the planner developed the work instructions based on a historical work order and did not adequately identify the interaction between this circuit and the other control valves. During a pre-job briefing, the FIN supervisor informed the technicians that the leads in the enclosure were energized. However, a second contributing factor was the technician's complacency in not utilizing insulating materials, contrary to internal procedures, due to past success landing leads.

Q. What do these facts provided by FPL suggest to you?

A. These facts demonstrate that even with all the proper tools being available, the lack of management following known processes and procedures was the primary cause of the outage. While it appears FPL did hold the FIN Supervisor accountable for his actions, this does not negate the fact that management did not act in a prudent fashion based on the information known at the time. Based on the examples I gave earlier in my testimony, it appears that the employees were adequately trained, but did not follow written procedures for authorization, did not provide adequate oversight of the employees, and did not conduct the procedure according to approved written maintenance procedures. Therefore, I recommend to the Commission that the replacement power costs of $1,434,048 plus interest be refunded to FPL's customers.

<u>January 2022 St. Lucie Unit 2 Outage</u>

Q. What is your understanding as to the cause(s) of this outage?

A. It is my understanding that the ultimate cause of the outage was a broken piece of a tool that was lodged on the latching mechanism for the Control Element Drive Mechanism. The tool, referred to as a SCOUT, is used during refueling activities so

apparently the piece broke off and became lodged during the unit's last refueling outage. During the last refueling, the vendors apparently experienced some difficulty with the SCOUT and ultimately had to use a backup tool to finish the task. According to Witnesses DeBoer and Gebbie, the individuals inspected the defective tool but did not recognize that the part was missing or damaged because the part cannot be examined without Westinghouse disassembling the tool. According to Witness DeBoer, FPL has incorporated a new complex tool inspection process and procedures to address the SCOUT failure.

Q. Is this explanation consistent with the RCE provided by FPL?

A. Not entirely. While the physical cause of the outage is consistent, i.e. the broken SCOUT pin, the events leading up to the discovery and the subsequent actions are a bit different. For example, the RCE found that the SCOUT tool is not a standard tool used throughout the industry and that the workers did not use the existing Complex Tool Inspection Checklist that is used throughout FPL's nuclear fleet. Therefore, it is not surprising that although a brief inspection of the failed tool was performed after it was removed from service, the individuals were not adequately knowledgeable about the tool to identify the issue. The SCOUT actually had two pins missing and the second pin has yet to be found. In addition, FPL has in place the requirement to develop a Foreign Material Exclusion (FME) Plan during control element coupling activities. The RCE also found that no such FME plan for the SCOUT tool had been developed. Apparently, complex tooling requirements have existed in the FME procedures since 2016. However, complex tool risk discussion has been lacking in prior FME plans and the key individuals who were responsible for this level of planning are no longer with the Company.

Q. Do you have any other unanswered questions regarding this outage?

A. Yes. If the pins of the SCOUT tool are unable to be inspected without disassembly of the tool, how did they fall out in the first place? Also, if the new complex tool inspection process adopted by FPL would not be able to identify the broken or missing pins in the SCOUT, why has the inspection process been adopted? Such an action is contrary to Witness Gebbie's assertion that causal evaluations should result in specific corrective actions that should prevent the event(s) from happening again.

Q. What do these facts provided by FPL suggest to you?

A. These facts demonstrate that FPL management did not follow proper written procedures to discuss complex tool risk as part of the FME plan. In addition, it appears that the vendors performing the tasks were not adequately trained or familiar with the SCOUT tool to identify the broken and missing pins. It also appears the proposed corrective actions instituted by FPL will not prevent a similar event from happening in the future. For these reasons, I recommend to the Commission that the replacement power costs of $8,693,593 plus interest be refunded to FPL's customers.

Q. Does this conclude your testimony?

A. Yes, it does.

2020 Outages			
Unit	**Description**	**Duration**	**Replacement Power Costs**
TP 4	The Exciter Permanent Magnet Generator failed due to a combination of the aged condition of the stator windings and exposure to moisture.	July 5 - 20	$1,453,970
TP 3	Unit 3 experienced an automatic turbine runback, initiated after failure of multiple valves on the secondary feed system. These valve failures were a result of an equipment failure with the plant Secondary Control.	November 7 - 21	$ 1,290,604

2021 Outages			
Unit	**Description**	**Duration**	**Replacement Power Costs**
SL 2	The 4kV breaker for the 1A Auxiliary Transformer had a leaking SF6 gas suppression bottle. The unit was required to be removed from service for replacement of the breaker.	January 14 -16	$ 220,926
SL 2	The legacy drawings for the UV relay assemblies in the control element drive mechanism control system were changed in 1983 and did not conform to St. Lucie Unit 2 train and channel design conventions. This legacy defect resulted in inadvertently mis-assigning power to two of the four UV relays to the incorrect train of power when the rod control system was replaced in 2019.	January 20 - 24	$ 959,524
TP 3	A power reduction caused by a condenser tube leak.	February 2 - 10	$ 1,146,159
TP 3	During the restoration phase after planned testing the unit experienced an automatic shut down. FPL determined the most probable cause was hardened graphite grease on the cell switch.	March 1 - 4	$ 1,206,743
SL 1	During a restart from a planned outage, FPL determined the Lower Gripper Coils for a group of control element assemblies had malfunctioned due to damage from excessive current.	May 14 - 17	$ 1,517,511
TP 3	The units Turbine Control Valve (TCV) unexpectedly closed. During inspection the actuator stem (rod) was found sheared.	August 13 - 25	$ 2,766,857
TP 3	An outage at TP3 was extended when the Manipulator Gripper encountered issues during replacement and a reactor coolant system leak was identified while bringing the unit back online during inspections.	November 7 - 20	$ 10,054,734
SL 1	SL1 was manually tripped due to the loss of the feedwater level control system. While replacing a Pressure Differential Indicating Switch, the technician made inadvertent contact with the enclosure housing resulting in the supply fuse to blow.	December 10 - 12	$ 1,434,048

2022 Outages			
Unit	**Description**	**Duration**	**Replacement Power Costs**
SL 2	During testing of the Rod Control system, the #27 Control Element Drive Mechanism (CEDM) motor malfunctioned and the unit was manually shut down.	January 6 - 21	$ 8,693,593
TP 4	Turkey Point Unit 4 suspended the power ascension after a refueling outage to hold power at 50% in order to troubleshoot and repair a malfunctioning Flux Map Detector system.	Apr 14 (23.67 hrs.)	$ 94,275
SL 2	This was a power reduction as a result of a 2A Heater Drain Pump motor tripping due to the motor windings electrically failing to ground during an extreme weather event. This occurred simultaneous with a Tornado Warning being issued by the State Watch office.	June 6 - 12	$ 328,110
SL 1	During the final scheduled power reduction to take the unit offline, the 1A Main Feed Pump tripped due to its recirculation valve failing to open. The valve failed to open due to an internal pneumatic blockage.	Sep 22 (1.22 hrs.)	$ 33,117
SL 1	On October 28, 2022, the St. Lucie Unit 1B drain cooler developed a tube leak. To maintain reactor coolant temperature within limits reactor power was reduced to approximately 98% for 3.57 days.	Oct 28 – Nov 1	$ 40,077
SL 1	On November 1, 2022, reactor power was further reduced to approximately 97% for 13.4 days to get a safe boundary and isolate the issue to facilitate a repair power for the drain leak.	November 1 -14	$ 271,023
SL 1	On November 14, reactor power was again reduced to approximately 75% to allow for isolation and repair of the 1B drain cooler for 4.76 days.	November 14 -18	$ 868,523
SL 2	AC fuse blew causing the loss of a circuit that powered the condensate pump recirculating valve. As a result, this required down powering the unit to 91%.	Dec 19 (12.07 hrs.)	$ 28,676
TOTAL			$32,408,470

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Fuel and purchased power cost recovery clause with generating performance incentive factor.	DOCKET NO. 20240001-EI DATED: February 5, 2024

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the Direct Testimony of Tom Ballinger on behalf of the Florida Public Service Commission has been served by electronic mail to the following this 5th day of February, 2024:

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