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STEFANIE A. BRAND
Director

January 29, 2021

Via Electronic Mail
Aida Camacho-Welch, Secretary
New Jersey Board of Public Utilities
44 South Clinton Ave., 10th Floor
P.O. Box 350
Trenton, New Jersey 08625-0350
Board.Secretary@bpu.nj.gov
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Re: In the Matter of the Application of PSEG Nuclear, LLC And Exelon Generation Company, LLC for the Zero Emission Certificate Program - Salem Unit 1 Dkt. No. ER20080557

In the Matter of the Application of PSEG Nuclear, LLC And Exelon Generation Company, LLC for the Zero Emission Certificate Program - Salem Unit 2 Dkt. No. ER20080558

In the Matter of the Application of PSEG Nuclear, LLC for the Zero Emission Program- Hope Creek Dkt. No. ER20080559

Dear Secretary Camacho-Welch:

Please accept for filing copies of the testimonies of Ms. Andrea Crane and Mr.. Maximillian Chang being filed on behalf of the Division of Rate Counsel ("Rate Counsel") in connection with the above matter. The comments and testimonies contain information claimed to be confidential by Applicant PSEG Nuclear. Therefore Rate Counsel is filing both a "**PSEG Confidential" and a redacted "Public" version with the Board**. Electronic copies of the redacted version are being sent to all parties on the attached service list. On the other hand, electronic copies of the confidential version are **only** being provided via a separate electronic mail to the parties entitled to receive information that has been designated as "confidential" by PSEG Nuclear.

Pursuant to the Order issued by the Board dated March 19, 2020 under Docket No. EO20030254, Rate Counsel serves copies of these documents to the parties in electronic format only.

Thank you for your attention to this matter.

Respectfully submitted,

STEFANIE A. BRAND, DIRECTOR
DIVISION OF RATE COUNSEL

By: /s/ *Sarah H. Steindel*
Sarah H. Steindel, Esq.
Assistant Deputy Rate Counsel

SS/dl
Enclosures
cc: Service List (via electronic mail)

BEFORE THE STATE OF NEW JERSEY

BOARD OF PUBLIC UTILITIES

I/M/O THE IMPLEMENTATION OF] THE APPLICATION OF PSEG NUCLEAR, LLC] AND EXELON GENERATION COMPANY, LLC] FOR THE ZERO EMISSION CERTIFICATE] PROGRAM – SALEM 1, SALEM 2, AND] HOPE CREEK]	BPU Docket Nos. ER20080557, ER20080558 & ER20080559

TESTIMONY OF ANDREA C. CRANE
ON BEHALF OF THE
NEW JERSEY DIVISION OF RATE COUNSEL

STEFANIE A. BRAND, ESQ.
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FILED: January 29, 2021

PUBLIC VERSION

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1. Introduction

Q. Please state your name and business address.

A. My name is Andrea C. Crane and my business address is 2805 East Oakland Park Boulevard, #401, Fort Lauderdale, Florida 33306.

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

A. I am President of The Columbia Group, Inc., a financial consulting firm that specializes in utility regulation. In this capacity, I analyze rate filings, prepare expert testimony, and undertake various studies relating to utility rates and regulatory policy. I have held several positions of increasing responsibility since I joined The Columbia Group, Inc. in January 1989. I have been President of the firm since 2008.

Q. Please summarize your professional experience in the utility industry.

A. Prior to my association with The Columbia Group, Inc., I held the position of Economic Policy and Analysis Staff Manager for GTE Service Corporation, from December 1987 to January 1989. From June 1982 to September 1987, I was employed by various Bell Atlantic (now Verizon) subsidiaries. While at Bell Atlantic, I held assignments in the Product Management, Treasury, and Regulatory Departments.

Q. Have you previously testified in regulatory proceedings?

A. Yes, since joining The Columbia Group, Inc., I have testified in over 400 regulatory proceedings in the states of Arizona, Arkansas, Connecticut, Delaware, Florida, Hawaii, Kansas, Kentucky, Maryland, New Jersey, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Vermont, Washington, West Virginia and the District of Columbia. These proceedings involved electric, gas, water, wastewater, telephone, solid waste, cable television, and navigation utilities. A list of dockets in which I have filed testimony over the past five years is included in Appendix A.

Q. What is your educational background?

A. I received a Master of Business Administration degree, with a concentration in Finance, from Temple University in Philadelphia, Pennsylvania. My undergraduate degree is a B.A. in Chemistry from Temple University.

2. Purpose of Testimony

Q. What is the purpose of your testimony?

A. On October 1, 2020, PSEG Nuclear LLC ("PSEG") and Exelon Generating Company, LLC ("Exelon", collectively "Companies") filed applications with the New Jersey Board of Public Utilities ("BPU" or "Board") requesting that the BPU authorize the disbursement of subsidies pursuant to the Zero Emission Certificate ("ZEC") Program. The Companies are seeking subsidies during the second eligibility period of June 1, 2022 through May 31, 2025. The BPU previously approved the payment of subsidies for the first eligibility period of April 18, 2019 through May 31, 2022 in BPU Docket No. EO18080899.

The ZEC Program was authorized pursuant to legislation ("ZEC Act") that was signed into law on May 23, 2018. That legislation allows for New Jersey ratepayers to subsidize non-regulated nuclear operating units that are shown to have a beneficial impact on air quality in the state. P.L. 2018, c.16, N.J.S.A. 48:3-87.3 et seq. In order to receive a subsidy, the nuclear operator not only must demonstrate that a unit has a beneficial impact on air quality, but must also demonstrate and certify that the unit will be shut down for economic reasons within the next three years in the absence of a financial subsidy.

Subsidies from New Jersey ratepayers are capped at 0.4 cents per kilowatt-hour ("kWh"), according to N.J.S.A. 48:3-87.5 (j). In addition, the total nuclear generation eligible for the subsidy is capped at 40% of the state's retail electric sales for the energy year preceding the enactment of the statute, that is, Energy Year 2017. N.J.S.A. 48:3-87.5(g). Therefore, the subsidy payments to the Companies are capped at $10 per megawatt-hour ("MWh").[1]

PSEG and Exelon are owners of the Salem 1 and Salem 2 nuclear generation units, which are located in Lower Alloways Creek Township, New Jersey. PSEG owns 57.41% of each unit and is the operator of the units. Exelon owns the remaining 42.59% of Salem 1 and Salem 2. In addition, PSEG is the sole owner and operator of the Hope Creek nuclear generation unit, which is located at the same site. In their filings, PSEG and Exelon are requesting subsidies in order to continue to operate Salem 1 and Salem 2 for the next three years. In addition, PSEG is requesting a subsidy in order to continue operation of the Hope Creek nuclear generating facility.

[1] The ratepayer subsidy of .4 cents per kWh, or $4.00 per MWh, is charged on all retail electric sales. Assuming the subsidies are paid to generation facilities representing 40 percent of retail sales, the per MWh subsidy would be $4.00 divided by .4, or $10 per MWh.

The Columbia Group was engaged by the New Jersey Division of Rate Counsel ("Rate Counsel") to review the Companies' filings and to provide recommendations regarding various financial aspects of those filings. Specifically, I address whether the Companies have demonstrated that nuclear operations at each applicable unit will end within the next three years in the absence of a subsidy. I also address the amount of the subsidies being requested in this case and opine on the methodologies used by the Companies to support the requested subsidy. Finally, I will also comment on certain aspects of the Reports prepared by Levitan & Associates, Inc. ("Levitan Reports") for the New Jersey Board of Public Utilities, which were issued on January 19, 2021. In addition to my testimony, Rate Counsel is also filing testimony by Maximilian Chang, who addresses pro forma revenue forecasts and the environmental impacts of a possible shut-down.

3. Summary of Conclusions

Q. Please summarize your conclusions and recommendations.

A. Based on the Companies' filings, on the responses to discovery requests, and on other documentation in this case, my conclusions and recommendations are as follows:

- The Companies have not demonstrated that Salem 1, Salem 2, or Hope Creek will be shut down over the next three years if subsidies are not awarded by the BPU.
- The financial analyses provided by the Companies include significant costs associated with operational and market risks that are speculative and inappropriate to charge to regulated ratepayers in New Jersey. In addition, the methodologies proposed by the Companies would allow PSEG and Exelon to recover the full

cost of capital expenditures within one year, in violation of sound accounting practices.

- The Companies' analyses also contain cost estimates that are overstated and also ignore certain financial benefits associated with the nuclear units. In summary, the financial analyses do not support the claim that subsidies are required in order to keep the nuclear units operating over the next three years.
- In this case, the Board has the option to authorize ZEC subsidies that are less than the $10 per MWh authorized for the first eligibility period.
- In evaluating the Companies' filings, the Board should consider the fact that New Jersey energy prices are high relative to other states, and that the State's ratepayers are currently suffering economic hardships as a result of the Covid-19 pandemic.
- I recommend that no subsidies be awarded for the second eligibility period. However, if the Board finds that some subsidy is required, the Board should award a reduced subsidy, which should be no higher than the social cost of carbon discussed by Rate Counsel witness Max Chang.

4. <u>Basis of Review</u>

Q. Please describe the Companies' filings in this case.

A. As noted in its transmittal letters in this case, "…PSEG has been vested with the sole and exclusive authority to make retirement decisions for the plants, covering Exelon Generation's 42.59% minority ownership share as well as PSEG's 57.41% majority ownership share. The Salem plant submittals address all elements of the application for

100% of the ownership interest and are submitted on behalf of both owners. When possible, PSEG has provided financial data for 100% of the plant. However, in some cases, confidential financial data from Exelon Generation, that could not be shared with PSEG, was needed. With respect to such confidential information, Exelon Generation has made separate submittals as additional supporting materials to the Salem 1 [and Salem 2] application."[2]

Since PSEG is the operator of Salem 1 and Salem 2, and has "sole and exclusive authority" to make retirement decisions, our review focused primarily on an analysis of the financial data by PSEG for each nuclear unit. However, we also reviewed the applications submitted by Exelon.

Q. Are there aspects of this proceeding that differ from the Board's review for the first eligibility period?

A. Yes, there are several important differences between the Board's review of the applications for ZEC subsidies submitted for the first eligibility period and the current filings. For the first eligibility period, the Board held that it was required to either authorize a $10 per MWh ZEC subsidy or to decline to authorize ZEC subsidies altogether.[3] The Board ruled that the ZEC Act did not provide the Board with the flexibility to authorize some level of subsidy that was less than the full $10 per MWh during the first eligibility period. In this case, the parties do not dispute that the statute allows the Board the flexibility to find that some lower subsidy amount is adequate to

[2] PSEG Transmittal Letters, Salem 1 and Salem 2, footnote 3.

[3] While the Board found that it was required to either authorize a $10 per MWh ZEC subsidy or to decline to authorize any ZEC subsidy in the proceeding for the first eligibility period, this finding is currently under appeal by Rate Counsel.

ensure continued operation of the generating units. Therefore, the Board has significantly more latitude in this proceeding that it did during its prior review.

Q. What are the implications of this flexibility for the Board's review?

A. Given that the Board may undisputedly authorize a subsidy level that is less than $10 per MWh, the Board has a particular responsibility in this case to critically review each cost component included in the Companies' requests, and determine if each individual cost component is appropriate to include in its subsidy analysis. In addition, the Board should also consider broader issues, such as whether the Companies have sufficiently demonstrated that the requested subsidies are absolutely necessary to maintain operation of the plants. As will be discussed later in this testimony, there is a fairly wide gap between the shortfalls that are claimed by the Companies and the amount of the subsidies being requested. This obviously means that the Companies do not require that all of their alleged shortfalls be met in order to keep the plants open. The Board's task is to determine the minimum subsidy, if any, required by the Companies. This is by necessity a somewhat subjective analysis.

In addition, the Board should also consider the fact that even if it grants the full subsidies being requested, the Companies could still terminate operation of the facilities. In its 10-Q for the period ending September 30, 2020, PSEG stated that even if the Board approves its request for ZEC payments of $10 per MWh, it would still cease operations of the plants if "the financial condition of the plants is materially adversely impacted by changes in commodity prices, FERC's changes to the capacity market construct…, or, in the case of the Salem nuclear plants, decisions by the EPA and state environmental regulators regarding the implementation of Section 316(b) of the Clean Water Act and related stated regulations, or other factors."[4]

Q. Are there also external factors that the Board should consider?

A. Yes, there are at least two important external factors that the Board should consider when determining whether or not to authorize ZEC subsidies. First, the State of New Jersey, like the rest of the United States and in fact the entire world, is in the middle of an historic Covid-19 pandemic. This pandemic has destroyed thousands of small businesses, has resulted in job losses for many New Jersey residents, and has resulted in serious medical issues for many New Jersey ratepayers. It will likely take years for many ratepayers to recover from the medical, financial, and emotional impacts of the Covid-19 pandemic. In fact, many people will never recover.

Second, the State of New Jersey has relatively high electric rates. According to the U.S. Energy Information Administration, New Jersey's average retail electric rate is 13.42 cents per kWh, 27% above the national average.[5] At the same time, New Jersey had the highest seasonally adjusted unemployment rate of all 50 states and the District of Columbia, at 10.2%.[6] This suggests that ratepayers in New Jersey are hurting, and are worse off than their counterparts in many other states. The Board should ask itself if now is the appropriate time to continue to collect ZEC subsidies from New Jersey ratepayers in order to provide incentives to unregulated nuclear operators whose parent companies are providing millions of dollars of dividends annually to their stockholders.

[4] Public Service Enterprise Group, Inc. 10-Q for the quarter ending September 30, 2020, page 79.
[5] U.S. Energy Information Administration, State Electricity Profiles, November 2, 2020.
[6] U.S. Bureau of Labor Statistics, Unemployment Rates for States, issued December 18, 2020.

Given the fact that the Board has the option of reducing the subsidies awarded for the first eligibility period, given New Jersey's high electric rates, given the State's high unemployment, and given the other obstacles posed by the Covid-19 pandemic, the Board should find that the ZEC subsidies should be eliminated, or at the very least they should be significantly reduced.

5. Methodology

Q. What methodology has traditionally been utilized by the Board in evaluating the financial condition of New Jersey utilities?

A. The Board has traditionally utilized a rate base / rate of return methodology for evaluating the financial condition of regulated utilities. Under that methodology, the BPU sets utility rates that are designed to provide the regulated utility with a reasonable opportunity to recover its costs, including its cost of capital. Utility rates are designed to recover operating and maintenance costs, depreciation and amortization, and taxes. In addition, utility rates include a return on the investment that is used in the provision of utility service. That return includes two components – a return on debt, which reflects the utility's interest expense, and a return on equity, which reflects the profits to shareholders. While determining the return on debt is largely objective and non-controversial, determining an appropriate return on equity is more subjective and is usually one of the most contentious issues in any base rate case proceeding.

Q. **Did the Companies utilize a rate base / rate of return methodology in this filing?**

A. No, PSEG and Exelon did not utilize a traditional rate base / rate of return analysis in developing their requested subsidies. While the Companies did estimate the required cost of capital for the units under a rate base / rate of return methodology, they supported their proposed subsidies based on a cash-flow analysis. Essentially, the Companies compared their projected revenues from nuclear operations (including energy revenues, capacity revenues, and other ancillary revenues) with their projected costs – including both capital and operating costs. The Companies' costs include not only operating and maintenance costs, but also fuel and non-fuel capital expenditures on a "cash flow" basis, and so-called "cost of risks." The costs of risks included by PSEG and Exelon include two components – operating risk and market risk. As we will demonstrate below, the Companies' analyses provide a skewed picture of the Companies' projected financial condition and is not appropriate for purposes of authorizing a subsidy in this case.

Q. Are you recommending that the Board utilize the traditional rate base / rate of return methodology in this case?

A. No, I am not. Although the Board should make various adjustments to the Companies' analyses when evaluating whether a subsidy is required, the Board should not attempt to utilize a traditional rate base / rate of return approach for the Companies. Salem 1, Salem 2, and Hope Creek are deregulated assets. These generating facilities were deregulated in New Jersey pursuant to the Electric Discount and Energy Competition Act ("EDECA") and the owners of these nuclear facilities were compensated for stranded costs at that time. It would therefore be inappropriate for the Board to apply a regulated ratemaking methodology to determine if further financial subsidies are needed to maintain nuclear operations during the next three years. Nevertheless, as discussed below, the cash flow methodology utilized by the Companies is seriously flawed and should be modified by the Board.

6. Requested Subsidy

Q. What is the level of cash flow deficiency being projected by the Companies in this case during the second eligibility period?

A. As shown in the response to [Unit]-ZECJ-FIN-0002[7], and as further clarified by the response to Staff-PS-10, the Company provided its claimed projected cash flow shortfalls for the next three energy years. PSEG is projecting shortfalls for Salem 1, Salem 2, and Hope Creek that amount to **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[END PSEG CONFIDENTIAL]

These amounts are based on 100% of the financial results for Salem 1 and Salem 2. The operating and maintenance costs reflected in PSEG's analysis includes labor,

[7] PSEG provided similar information in all three of its applications for the three nuclear units at issue here. Salem 1 data was designated as "S1", Salem 2 data was designated at "S2", and Hope Creek data was designated as "HC". In referring to data requests relating to the three units, I have used the designation "Unit" to indicate that there are three similar responses that apply for the three nuclear units.

material, outside services, real estate taxes, support services and fully allocated overheads, spent fuel costs, cost of working capital, and other operating and maintenance costs. In addition, PSEG's analysis includes capital expenditures, including both fuel and non-fuel capital costs on a "cash flow" basis. Fuel-related capital expenditures are the capital expenditures associated with refueling outages, while non-fuel capital expenditures represent "spending on long-lived plant equipment required to maintain safe and reliable operations." Finally, the Company has also included the "cost of operational risk" and the "cost of market risk" as two components of its subsidy request.

Q. How much in ratepayer subsidies are the Companies requesting?

A. Based on projected generation from the three nuclear units, the requested subsidies would cost ratepayers $809.5 million over the next three energy years, as shown in the response to [Unit]-SSA-0002:

Projected ZEC Payments ($ Millions)

Unit	June 2022 - May 2023	June 2023 – May 2024	June 2024 – May 2025	Three Year Total
Salem 1	$93.4	$89.1	$102.0	$284.5
Salem 2	$91.2	$86.1	$87.2	$264.5
Hope Creek	$77.9	$97.5	$85.1	$260.5
Total	$262.5	$272.7	$274.3	$809.5

In addition, ZEC payments to the three nuclear units could be even higher if actual nuclear generation is higher than projected. As discussed below, PSEG has included inappropriate costs in its subsidy claim, has overstated certain costs, and has ignored important financial benefits associated with the units. Accordingly, the

Companies' have not demonstrated that the nuclear units will shut down over the next three years if ZEC payments are not authorized by the BPU.

A. Inclusion of Operational and Market Risks

Q. Please describe the operational and market risks that have been included in the Companies' projections.

A. The Statute that authorized the ZEC Program required applicants to provide costs, including "the cost of operational risks and market risks that would be avoided by ceasing operations…." N.J.S.A. 48:3-87.5(a). Operational risks included "the risk that operating costs will be higher than anticipated because of new regulatory mandates or equipment failures and the risk that per megawatt-hour costs will be higher than anticipated because of lower than expected capacity factors…" Id. As stated in the Statute, market risks included "the risk of a forced outage and the associated costs arising from contractual obligations, and the risk that output from the nuclear power plant may not be able to be sold at projected levels." Id.

The Companies have included significant costs relating to Operational Risk and Market Risk in their claims for subsidies. PSEG states in its response to [Unit]-ZECJ-FIN-22 that Market Risk is the risk associated with **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]** while Operational Risk is the risk associated with the **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[redacted].

[redacted]. **[END PSEG CONFIDENTIAL]**

Q. How much has the Company included in its claims relating to Operational and Market risks?

A. PSEG has proposed to include the following costs relating to Operating Risk and Market Risk in its three-year subsidy claim: **[BEGIN PSEG CONFIDENTIAL]**

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]. **[END PSEG**

CONFIDENTIAL] Thus, a significant portion of the Company's overall claim for subsides relates not to objective and verifiable cost estimates, but to speculative risks. While the Legislature provided that these risks should be considered when evaluating whether or not a subsidy was required, they did not ensure recovery of these speculative costs from ratepayers.

Q. How do the operational and market risks included in the Companies' filing compare with the operational and market risks included during the first eligibility period?

A. The Operational Risks are slightly higher than those included in the first eligibility period. In addition, the Market Risk for Hope Creek is slightly higher than the Market Risk included in the first eligibility period. However, the Market Risks for Salem 1 and Salem 2 are approximately **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]**[8]

Q. Do operational and market risks represent real costs to the Companies?

A. No, the Operational and Market Risks included in the Companies' analysis do not reflect an actual cost to the nuclear operators. Instead, these components are cost "cushions" designed to protect nuclear operators from potential additional costs or lower revenues if the Companies' forecasts turn out to be incorrect. Ratepayers should be not be put in the

[8] Response to Staff-PS-4.

position of having to guarantee owners of these deregulated facilities against either market uncertainty or operational risks, especially when the nuclear operators themselves control much of the risk relating to operations.

With regard to Operational Risks, **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]** to evaluate Operational Risk. It is significant that PSEG only assumes that this Operational Risk will add costs to its nuclear operations. But it is just as likely that the Company's cost estimates will be understated rather than overstated. Presumably, its cost estimates provide the best indicator of expected future costs for nuclear operations, and many of these costs are directly under the Company's control. Therefore, while it is possible that costs could be higher than forecast, it is also possible that costs could be lower than forecast. PSEG did not provide any recognition in its applications that costs could actually be less than forecast, i.e., it made no adjustment for the possibility that its forecasts may be overstated. Accordingly, the Operational Risk adjustment is one-sided and places an unreasonable burden on New Jersey ratepayers. The purpose of providing cost estimates is so the BPU can make its decision regarding subsidies based on the most realistic available data with regard to future operational factors and costs. The subsidies provided for in the ZEC Legislation were not intended to be a guarantee for the owners of these unregulated merchant plants that their costs would be reimbursed by ratepayers in all cases. Therefore, the BPU should not inflate any subsidy requirements in order to ensure guaranteed recovery for these unregulated facilities.

Similarly, with regard to Market Risks, ratepayers should not be the guarantors of last resort for all possible contingent risks related to operating revenues. The fact is that the nuclear units at issue have been deregulated for approximately 20 years. At the time of deregulation, ratepayers paid hundreds of millions of dollars in stranded costs to the owners of the nuclear facilities, based on perceived risks and expectations that market prices would not be high enough to allow owners to recover all of their investment. However, for much of the time since deregulation, the nuclear operators have generally done very well, with actual costs falling far below market prices, resulting in significant profits from these nuclear units. There was no return of stranded costs payments to ratepayers when market prices were above the cost to operate the nuclear units.

In addition, similar to its treatment of operational risk, PSEG only assumed that Market Risk would increase its costs. There is no recognition that conditions in the energy market during the second eligibility period may actually result in higher than anticipated revenues for the generating units.

Q. Did the Companies make strategic decisions to extend the operating licenses for all three units prior to enactment of the ZEC Act?

A. Yes, they did. The original operating licenses for the three units at issue were all due to expire after 40 years of operation. Under the original operating licenses, Salem 1 would have been shut down by now, and Salem 2 and Hope Creek would be retired in 2021 and 2026 respectively. In 2009, PSEG requested authorization to extend the operating licenses of these units. Although the units were originally regulated, by the time that PSEG requested an extension of their operating licenses the units were deregulated and presumably PSEG made a calculated business decision to request an extension of the operating licenses. At that time, the Companies presumably were more than satisfied with the level of earnings being generated by these nuclear units. Now that market conditions have changed and energy revenues have declined, it is unreasonable to require ratepayers to provide millions of dollars of subsidies without consideration of the substantial benefits that the nuclear operators have enjoyed in the past.

Q. What do you recommend with regard to market and operational risks?

A. I recommend that if the BPU permits the nuclear operators to charge ratepayers for subsidies that include Operational and Market Risks, then it should also reduce those subsidies to take into account prior benefits enjoyed by shareholders. This includes not only the higher profits enjoyed in prior years, but also other financial benefits, such as the retention of excess deferred income taxes and other tax benefits, as addressed later in my comments.

B. <u>Inclusion of Capital Expenditures on a Cash Flow Basis</u>

Q. How are capital expenditures reflected in the Companies' filings?

A. Under a traditional ratemaking mechanism, investment is recovered over the useful life of the underlying assets. Prior to full recovery, investors have the opportunity to earn a return on that investment, based on the embedded cost of long-term debt and on the return on equity authorized by the Board. This equity return is intended to compensate equity investors, based on comparable returns available to other investments of comparable risk.

The cash-flow approach presented by PSEG and Exelon in this case provides for immediate recovery of all capital investment – and the proposed capital costs are significant. What this means is that each year, PSEG and Exelon would be relieved from risk associated with incremental plant investment. This treatment is contrary to both common practice and basic accounting principles. In a deregulated environment, businesses are not assured of capital recovery within one year. In fact, just the opposite is true. It is usual and customary for deregulated businesses to make investments with the expectations that such investment will be recovered over a multi-year period – if at all.

Q. Please quantify the capital expenditures included in the Companies' subsidy claims.

A. **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] **[END PSEG CONFIDENTIAL]**

Q. What concerns do you have about reflecting total annual capital expenditures in each year's expected costs?

A. There are several concerns about including 100% of each year's capital expenditures in the subsidies to be provided by ratepayers. First, permitting the Companies to recover 100% of these costs in the year incurred violates a basic accounting principle that costs that provide a benefit over multiple years should be recovered over a multi-year period. Allowing for immediate recovery is contrary to this principle. Deregulated businesses do not have the expectation of immediate recovery of capital investment. This is especially true in the case of major investment that is designed to provide service for many years. The accounting community recognizes this fact and has developed accounting rules that are intended to provide investors with a realistic view of the financial impact of such investment over a long period of time.

Second, allowing for immediate recovery eliminates much of the Companies' risk that capital costs associated with these units will not be recovered. If the Legislature's intent was to eliminate all risk for nuclear operators, then it should require reregulation of those nuclear units that it determines must continue to run to serve the public interest. Under the Companies' proposal, however, ratepayers get the worst of both worlds, reimbursing supposedly unregulated entities for 100% of capital expenditures while not enjoying surpluses that may result should costs be lower, or revenues higher, than anticipated.

Third, recovering these costs over one year through subsidies paid by regulated ratepayers results in intergenerational inequity, in that it requires current ratepayers to pay for costs that are expected to provide benefits for many years into the future. In fact, under the Companies' proposal, ratepayers could finance all capital expenditures over the next three years and the Companies could later sell these nuclear units earning significant profits that would be then be retained by shareholders.

In addition, while the limited time that the parties have had to review the Applications does not permit Rate Counsel to undertake a detailed review of all capital projects for which costs were included in the subsidy calculation, it should be noted that many of the capital projects are ill-defined and may not be needed at all. A review of the capital budgets provided in the responses to RCR-PS-[Unit]-A0006 indicates that many of the costs included by the Company are identified as **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[redacted] **[END PSEG CONFIDENTIAL]**

The Company's capital budgets included in the subsidy requests also call into question the time frame over which an analysis of capital projects should be undertaken. The three-year review period specified by the Legislation for determining whether a subsidy is required is inconsistent with capital budgets that are designed to ensure continued operation over the remaining life of the operating permit for each nuclear facility. Even if the BPU decided to award ZECs to the Companies in this case, it is unlikely that ZECs would continue to subsidize these nuclear units over the next 15-20 years. Therefore, one should ask if it is reasonable for the BPU to consider in the subsidy calculation capital projects included in the nuclear operator's "business as usual" capital budgets, or whether the BPU should consider only those capital expenditures required to keep a unit operating for the next three years. Given the fact that these capital projects have not been shown to be necessary if one assumes that the plants will shut down at the end of the three-year ZEC cycle, and given the large amount of unallocated project funds included in the capital expenditure claims, the BPU should reject the Companies' request to recover these costs in subsidies from regulated ratepayers.

C. <u>Inclusion of Spent Fuel Costs</u>

Q. Did the Companies' include spent fuel costs in its estimated costs for the second eligibility period?

A. Yes, in its cost estimates, PSEG included claims relating to Spent Fuel costs. As discussed in the response to [Unit]-ZECJ-FIN-0025, PSEG included millions of dollars for Spent Fuel costs that are not actually being incurred by the nuclear operators. The Department of Energy ("DOE") had previously collected a charge from nuclear operators for disposal of nuclear fuel. The most recent charge was $0.955 per Mwh. However, the nuclear operators filed suit claiming that this charge should be terminated since DOE had not yet developed a plan to address the disposal of spent fuel. Accordingly, this Spent Fuel charge was suspended by Court Order in May 2014. Since that time, nuclear operators have not paid the Spent Fuel charge and nuclear operators are not accruing Spent Fuel costs on its books and records of account. Nevertheless, the Companies included Spent Fuel charges in the operating costs calculated for each nuclear unit. The Spent Fuel charges included in PSEG's cost projections range from **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]** over the three energy years that are the subject of the ZEC applications. Since PSEG is not liable for these costs and these costs are not being accrued by the nuclear operators, any allowance given to PSEG or Exelon related to Spent Fuel will simply accrue to the benefit of shareholders. Therefore, the BPU should reject the Companies' claims to consider Spent Fuel costs in its subsidy review.

D. <u>Inclusion of Support Services and Overhead Costs</u>

Q. Did the Companies include support services and overhead costs in its claims?

A. Yes, PSEG has included significant claims for support services and overhead costs in its requests for subsidies. Support services and overheads account for approximately **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted] **[END PSEG CONFIDENTIAL]**

Q. Have the Companies demonstrated that the service company and overhead allocation costs included in the subsidy claim are reasonable?

A. No, they have not. Given the nature of the service company and the overhead allocation process used by PSEG, I believe that PSEG's estimate of the variable portion of support service and overhead costs is inflated. By its nature, most of the costs incurred by the service company are fixed. In fact, the very nature of the service company is that it provides common support services to multiple corporate entities that can take advantage of economies of scale and share costs. It is unlikely that the majority of these costs will go away if the nuclear units are shut down. As stated in the response to [Unit]-ZECJ-FIN-0007, Support Services and Fully Allocated Overhead costs include "administrative and general expenses, costs associated with insurance, costs incurred outside of the site that directly support site activities, and corporate overhead costs." Many of these costs would be incurred even if the nuclear units shut down. While there may be some savings, it is unlikely that the majority of the costs would be avoided. Since many of these costs would not be avoided if the nuclear units were to shut down, PSEG has overstated the operating and maintenance costs associated with these three nuclear facilities in its analysis. In determining the need for any subsidy, the Board should consider only those costs that are incurred as a result of the operation of the three nuclear generating facilities. Attributing significant common costs incurred by the service company, as well as significant corporate overhead costs, to the nuclear units overstates the impact of continued operation of the units on the overall consolidated financial results of its owners.

E. <u>Exclusion of Hedging Revenues</u>

Q. Have the Companies also potentially understated the revenues associated with the nuclear units?

A. Yes, in addition to overstating the costs associated with nuclear units and including costs that are unreasonable to charge to New Jersey ratepayers through subsidy payments, PSEG also understated the revenues associated with nuclear operations. In his testimony, Mr. Chang discusses the Companies' projections of energy and capacity revenues and recommends adjustments to the forecasts. In addition to understating energy and capacity revenues from the units, the Companies also excluded hedging revenues in the analyses. In its response to [Unit]-ZECJ-FIN-0012, PSEG stated that it **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]** Both PSEG and Exelon participate in these types of hedging programs but neither PSEG nor Exelon included any revenues from hedging activities in the revenue forecasts.

Q. Does the Companies' treatment of hedging revenues overstate the need for subsidies?

A. Yes, it does. The Companies' failure to include revenues from hedging activities overstates the subsidies required, for two reasons. First, by not including hedging revenues, the Companies' revenue projections from nuclear operations are understated. Even if hedge contracts are not tied to specific generating units, the operation of the nuclear units provides an energy source that is integral to the hedging positions taken by the two Companies. Second, although revenues from hedging activities are not included in the calculated subsidy, the associated costs of the hedging activities were implicitly included through the variables used in the Market Risk models. As noted in the response to [Unit]-ZECJ-FIN-0018, **[BEGIN PSEG CONFIDENTIAL]** [redacted]

[END PSEG CONFIDENTIAL] The Companies' failure to consider hedging revenues in their analyses is another reason to reject the subsidies being requested by PSEG, since the analyses ignore hedging revenues while charging ratepayers for Market Risk that can be mitigated through the use of hedging mechanisms.

F. Additional Tax Benefits

Q. Are there certain tax benefits that have been excluded from the Companies analysis?

A. Yes, the Companies have generally ignored tax benefits in the analysis. For example, the Tax Cut and Jobs Act of 2017 ("TCJA"), which became effective January 1, 2018, had a major impact on the costs of corporations, both regulated and non-regulated. The most significant feature of the TCJA was the reduction in the corporate federal income tax rate from 35% to 21%. This reduction not only reduced the Companies' corporate income tax expense prospectively, but also resulted in millions of dollars of excess deferred income taxes relating to the nuclear units that are at issue in this case.

In some cases, the tax treatment given to certain costs involving the nuclear units differs from the treatment pursuant to Generally Accepted Accounting Principles ("GAAP"). The difference between the taxes recorded pursuant to GAAP and the IRS tax treatment is booked by companies as accumulated deferred income taxes. In most cases, these differences relate to timing differences between tax and book treatment, and therefore the accumulated deferred income tax balances reverse over time. Accumulated deferred income taxes are calculated based on the current income tax rates. When the federal corporate income tax rate was lowered, the Companies found themselves with millions of dollars of accumulated deferred income taxes that will never "reverse" due to the fact that these taxes were initially recorded at a 35% tax rate tax but future taxes will be paid based on the lower 21% rate.

Excess deferred income taxes are the difference between the accumulated deferred income tax liability booked at the prior federal income tax rate of 35% and the accumulated deferred income tax liability at the new federal income tax rate of 21%. In the case of regulated entities, any excess deferred income tax asset is returned to regulated ratepayers. However, in the case of unregulated entities, the impact resulting from any change in the tax rates is immediately reflected in the income statement. Therefore, in 2017, after the TCJA was enacted, both PSEG and Exelon recorded credits to net income, essentially providing shareholders with the benefits of the excess deferred income taxes that would have been refunded to ratepayers in a regulated environment.

Moreover, in addition to the benefits retained by the Companies associated with excess deferred income taxes, there are also other tax benefits associated with the nuclear units. The units at issue in this proceeding are held by limited liability companies ("LLCs"), and profits and losses are passed through to the LLC member. Since PSEG and Exelon both file consolidated federal income tax returns, tax losses incurred by the LLC and passed through to the member can be used to offset income earned by other entities in the consolidated income tax group. This arrangement can be especially beneficial if other members of the consolidated income tax group, such as regulated utilities, have significant taxable income. No consideration of these tax benefits was provided in the subsidy analyses provided by the Companies.

Finally, there are additional investment tax credits and other tax benefits that have been excluded from the Companies' Applications. As discussed in the response to Staff-PS-0014, there are certain tax benefits associated with prior tax filings that have not been considered in the development of the Companies' requests for subsidies. In addition, as stated in the responses to RCR-PS-[UNIT]-E-0002, there are also certain investment tax credits that have not been reflected in the financial information provided by PSEG. The Companies failure to adequately consider various tax benefits associated with the nuclear generating units is another reason why the analyses are flawed and should be rejected by the Board.

Q. Based on your analysis, are you recommending that the Board authorize ZEC subsidies for the Companies during the second eligibility period?

A. No, I am not. As demonstrated above, the Companies have overstated their projected shortfalls by including speculative Operational and Market risks in their analyses. In addition, the Companies have included significant costs for Support Services and Overheads, many of which would not be eliminated if the generating units were to be shut-down. The Companies have also based their claims on the premise that all capital expenditures would need to be recovered in the year incurred. Moreover, the Companies have included Spent Fuel costs, which are not currently being incurred, and have ignored various tax benefits from which the Companies are benefitting. The Companies have also understated future revenues, as discussed by Mr. Chang. In addition to flaws in the calculation of the Companies' cash flows, the Companies have acknowledged that the generating units have potential strategic value that is being considered by the owners.

Therefore, based on the record in this case, I recommend that the Board deny the Companies' request for ZEC subsidies during the second eligibility period and instead find that no subsidies are required.

7. Comments on Levitan Report

Q. Have you reviewed the Levitan Report filed on January 19, 2021 on behalf of the Board's Staff?

A. Yes, I have. In their report, Levitan identifies many of the same concerns that I have identified in my testimony regarding the inclusion of speculative and questionable "costs." Levitan refers to these as "non-incurred costs". In addition, Levitan also recommends adjustments to the energy and capacity revenues assumed by the Companies in their Applications.

Q. What level of subsidy is Levitan recommending?

A. As a result of various revenue and expense adjustments, Levitan recommends that the Board approve ZEC subsidies of no more than **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]** While Mr. Chang will address Levitan's recommendations with regard to revenues, I concur with Levitan that the costs of Operational Risks and Market Risks should be eliminated from the Companies' subsidy claims, for the reasons stated above. In addition, I also concur with Levitan that the costs of Spent Fuel Disposal should be eliminated. Finally, it is my understanding that Mr. Chang also concurs with Levitan that PSEG has understated revenues. Therefore, even if the Board rejects some of the adjustments that I recommended above, the Board's own consultant has demonstrated that the $10 per MWh ZEC subsidies requested by the Companies are excessive and should be rejected.

8. <u>Conclusions and Recommendations</u>

Q. Have the Companies' demonstrated that ZEC subsidies of $10 per MWh are necessary in order to maintain operation of the nuclear units?

A. No, they have not. The financial projections submitted by the Companies do not demonstrate that Salem 1, Salem 2, or Hope Creek require subsidies pursuant to the ZEC Program in order to remain in operation for the next three years. The shortfalls projected by the Companies are based on speculative Operational and Market Risks. In addition, these shortfalls include unrealistic assumptions about the recovery of capital expenditures, include inflated costs for Spent Fuel and Support Services and Overheads, and exclude other sources of revenue such as hedging revenues. The Companies' analyses also ignore other important benefits provided by nuclear operations, such as tax benefits that flow to the consolidated income tax group.

When one eliminates from the Companies' projections a) the speculative Operational and Market Risks, b) the capital expenditures that the Companies are seeking to recover over one year, c) the phantom Spent Fuel costs that are not actually being incurred, and d) the largely fixed service company and overhead costs, the shortfalls projected by the Companies are more than eliminated, as shown below:

[BEGIN PSEG CONFIDENTIAL]

[redacted]

[redacted] **[END PSEG CONFIDENTIAL]** that are speculative or otherwise unreasonable to collect from New Jersey ratepayers. In addition, there are excess deferred tax benefits, other tax benefits, and hedging revenues that have not been considered in the Companies' analyses and which are not included in the Total Adjustments shown above. While the BPU may want to give consideration to some allowance for capital costs and support services in evaluating the financial impacts of the three nuclear units at issue in this case, it is clear that the shortfalls projected by the Companies are overstated. Moreover, as discussed in Mr. Chang's testimony and in the Levitan Report, the energy and capacity revenues included in the Companies' financial projections are likely understated. In fact, it is likely that the revenues from Salem 1, Salem 2, and Hope Creek will be sufficient to sustain nuclear operations over the next three years. Accordingly, the BPU should reject the requests made by PSEG and Exelon for ratepayer subsidies through the ZEC Program.

Q. Are there other reasons to reject the Companies' request for subsidies at this time?

A. Yes, there are. If one accepts the Companies' cost projections, including those speculative costs such as Operational and Market risks, then the ZEC subsidies of $809.5 million are clearly not sufficient to cover the entire shortfall of **[BEGIN PSEG CONFIDENTIAL]** [redacted]. **[END PSEG CONFIDENTIAL]** While PSEG maintains that it will shut down the nuclear units if the requested subsidies are not approved, the Board has no way of knowing exactly how much, if any, subsidy is required in order to ensure continued operation of the units. Clearly, the Company does not need to cover its entire projected shortfall for the units to remain viable. While the Companies state that the entire $10 per MWh subsidy is required in order to keep the units operating, the Board has no way to independently verify if that is the case. In fact, the Companies themselves may not know exactly how much of a subsidy, if any, is required in order to keep the units operating.

Moreover, with the recent change of administration, there may be new policies and federal programs that would assist the Companies to continue operation of the units. Mr. Izzo, Chairman, President and CEO, indicated on a September 30, 2020 investors' call that "…we do think that the direction of Public Policy, both in New Jersey and in the nation is the increased recognition of the importance of carbon-free energy to mitigate climate change, and that value will eventually be more fully recognized."

Based on the data provided in this proceeding, Rate Counsel recommends that the Board reject the Companies' request for ZEC subsidies of $10 per MWh, and instead finds that the Companies have not demonstrated a need for any subsidies at this time.

Q. If the Board determines that some level of ZEC subsidy is appropriate, how should it determine the level of subsidy to award?

A. If the Board elects to award ZECs to the Companies, the ZEC subsidies should be reduced to reflect elimination of non-incurred costs and to reflect reasonable revenue estimates. In addition, as discussed in the testimony of Mr. Chang, any subsidy awarded by the Board should be no higher than the social cost of carbon, which Mr. Chang quantifies as **[BEGIN PSEG CONFIDENTIAL]** [redacted] **[END PSEG CONFIDENTIAL]**

Q. Does this complete your testimony?

A. Yes, it does.

APPENDIX A

The Columbia Group, Inc., Testimonies of Andrea C. Crane

Company	Utility	State	Docket	Date	Topic	On Behalf Of
PSEG Nuclear and Exelon Generation Company	E	New Jersey	ER20080557-559	1/21	Nuclear Subsidies	Division of Rate Counsel
Utilities, Inc. of Florida	W/WW	Florida	20200139-WS	11/20	Revenue Requirements	Office of Public Counsel
El Paso Electric Company	E	New Mexico	20-00104-UT	10/20	Revenue Requirements	Office of Attorney General
Public Service Company of New Mexico	E	New Mexico	20-00121-UT	9/20	Regulatory Disincentive Mechanism	Office of Attorney General
Peoples Gas System	G	Florida	20200051-GU	9/20	Revenue Requirements	Office of Public Counsel
New Mexico Gas Company	G	New Mexico	19-00317-UT	7/20	Revenue Requirements	Office of Attorney General
El Paso Electric Company	E	New Mexico	19-00317-UT	4/20	CCN For Newman Unit 6	Office of Attorney General
Public Service Company of New Mexico	E	New Mexico	19-00195-UT	12/19	Replacement Resources for SJGS Units 1 and 4	Office of Attorney General
Southwestern Public Service Company	E	New Mexico	19-00170-UT	11/19	Revenue Requirements	Office of Attorney General
Atmos Energy Company	G	Kansas	19-ATMG-525-RTS	10/19	Revenue Requirements	Citizens' Utility Ratepayer Board
Public Service Company of New Mexico	E	New Mexico	19-00018-UT	10/19	Abandonment of SJGS and Stranded Cost Recovery	Office of Attorney General
Rockland Electric Company	E	New Jersey	ER19050552	10/19	Revenue Requirements	Division of Rate Counsel
Avista Corporation	E/G	Washington	UE-190334/UG-190335	10/19	Revenue Requirements	Public Counsel Unit
Westar Energy, Inc.	E	Kansas	19-WSEE-355-TAR	6/19	JEC Capacity Purchase	Citizens' Utility Ratepayer Board
Empire District Electric Company	E	Kansas	19-EPDE-223-RTS	5/19	Revenue Requirements	Citizens' Utility Ratepayer Board
Public Service Electric and Gas Co.	E/G	New Jersey	EO18060629/ G018060630	3/19	Energy Strong II Program	Division of Rate Counsel
Southwestern Public Service Company	E	New Mexico	18-00308-UT	2/19	Voluntary Renewable Energy Program	Office of Attorney General
Zero Emission Certificate Program (Various Applicants)	E	New Jersey	EO18080899	1/19	Zero Emission Certificates Subsidy	Division of Rate Counsel
Public Service Company of New Mexico	E	New Mexico	18-00043-UT	12/18	Removal of Energy Efficiency Disincentives	Office of Attorney General
Kansas Gas Service	G	Kansas	18-KGSG-560-RTS	10/18	Revenue Requirements	Citizens' Utility Ratepayer Board
New Mexico Gas Company	G	New Mexico	18-00038-UT	9/18	Testimony in Support of Stipulation	Office of Attorney General
Kansas City Power and Light Company	E	Kansas	18-KCPE-480-RTS	9/18	Revenue Requirements	Citizens' Utility Ratepayer Board
Public Service Electric and Gas Co.	E/G	New Jersey	ER18010029/ GR18010030	8/18	Revenue Requirements	Division of Rate Counsel
Westar Energy, Inc.	E	Kansas	18-WSEE-328-RTS	6/18	Revenue Requirements	Citizens' Utility Ratepayer Board
Southwestern Public Service Company	E	New Mexico	17-00255-UT	4/18	Revenue Requirements	Office of Attorney General
Empire District Electric Company	E	Kansas	18-EPDE-184-PRE	3/18	Approval of Wind	Citizens' Utility

Company	Utility	State	Docket	Date	Topic	On Behalf Of
					Generation Facilities	Ratepayer Board
GPE/ Kansas City Power & Light Co., Westar Energy, Inc.	E	Kansas	18-KCPE-095-MER	1/18	Proposed Merger	Citizens' Utility Ratepayer Board
Public Service Electric and Gas Co.	E	New Jersey	GR17070776	1/18	Gas System Modernization Program	Division of Rate Counsel
Southwestern Public Service Company	E	New Mexico	17-00044-UT	10/17	Approval of Wind Generation Facilities	Office of Attorney General
Kansas Gas Service	G	Kansas	17-KGSG-455-ACT	9/17	MGP Remediation Costs	Citizens' Utility Ratepayer Board
Atlantic City Electric Company	E	New Jersey	ER17030308	8/17	Base Rate Case	Division of Rate Counsel
Public Service Company of New Mexico	E	New Mexico	16-00276-UT	6/17	Testimony in Support of Stipulation	Office of Attorney General
Westar Energy, Inc.	E	Kansas	17-WSEE-147-RTS	5/17	Abbreviated Rate Case	Citizens' Utility Ratepayer Board
Kansas City Power and Light Company	E	Kansas	17-KCPE-201-RTS	4/17	Abbreviated Rate Case	Citizens' Utility Ratepayer Board
GPE/ Kansas City Power & Light Co., Westar Energy, Inc.	E	Kansas	16-KCPE-593-ACQ	12/16	Proposed Merger	Citizens' Utility Ratepayer Board
Kansas Gas Service	G	Kansas	16-KGSG-491-RTS	9/16	Revenue Requirements	Citizens' Utility Ratepayer Board
Public Service Company of New Mexico	E	New Mexico	15-00312-UT	7/16	Automated Metering Infrastructure	Office of Attorney General
Kansas City Power and Light Company	E	Kansas	16-KCPE-160-MIS	6/16	Clean Charge Network	Citizens' Utility Ratepayer Board
Kentucky American Water Company	W	Kentucky	2016-00418	5/16	Revenue Requirements	Attorney General/LFUCG
Black Hills/Kansas Gas Utility Company	G	Kansas	16-BHCG-171-TAR	3/16	Long-Term Hedge Contract	Citizens' Utility Ratepayer Board
General Investigation Regarding Accelerated Pipeline Replacement	G	Kansas	15-GIMG-343-GIG	1/16	Cost Recovery Issues	Citizens' Utility Ratepayer Board
Public Service Company of New Mexico	E	New Mexico	15-00261-UT	1/16	Revenue Requirements	Office of Attorney General

BEFORE THE STATE OF NEW JERSEY

BOARD OF PUBLIC UTILITIES

I/M/O THE IMPLEMENTATION OF	]	
L. 2018, c.16 REGARDING THE	]	
ESTABLISHMENT OF A ZERO EMISSION	]	BPU DKT. NO. ER20080557,
CERTIFICATE PROGRAM FOR	]	ER20080558 & ER20080557
ELIGIBLE NUCLEAR POWER PLANTS	]	

TESTIMONY OF MAXIMILIAN CHANG
ON BEHALF OF THE
NEW JERSEY DIVISION OF RATE COUNSEL

STEFANIE A. BRAND, ESQ.
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FILED: January 29, 2020

PUBLIC VERSION

Table of Contents

I. Introduction

Q. Please state your name and business address.

A. My name is Maximilian Chang. I am a principal associate at Synapse Energy Economics, Inc. ("Synapse"). Synapse is a consulting firm that provides economic and expert advice to public interest clients on electricity matters. My business address is 485 Massachusetts Avenue #3, Cambridge, MA 02139.

Q. Please describe your professional experience.

A. I have experience working with public interest clients in the electric utility and natural gas industries, as well as with private entities. My electric industry work has focused on regulatory policy, distribution system reliability, and resource economics. I joined Synapse in 2008. Before that, I was a senior scientist at Environmental Health and Engineering, Inc., which I joined in 2001.

I received an A.B. in classical civilization and biology from Cornell University, and a S.M. in environmental health and engineering from the Harvard School of Public Health. I have provided testimony or testified before the public utility commissions of Delaware, District of Columbia, Hawaii, Illinois, Kansas, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, and Vermont. In 2018, I submitted comments regarding the first zero emission certificate ("ZECs") application filing in New Jersey Board of Public Utilities ("BPU" or "the Board") dockets (EO18121338, EO18121339, and EO18121337). My resume is attached as Attachment MPC-1.

II. Purpose

Q. What is the purpose of your testimony?

A. PSEG Nuclear LLC ("PSEG") and Exelon Generation Company, LLC ("Exelon") or collectively ("the Applicants") seek approval from the BPU to receive ZECs for the second three-year period starting June 1, 2022 under the ZEC Act.[1]

The purpose of my testimony is to review and comment on aspects of the Applicants' materials as it pertains to the ZEC Act. If approved in its current form, the three applications for Hope Creek, Salem 1, and Salem 2 would continue to transfer approximately $270 million per year from New Jersey ratepayers to the Applicants starting June 1, 2022. That I do not comment on other components of the Applications does not mean that I necessarily agree with the Applicants.

III. Summary of Conclusions and Recommendations

Q. Please summarize your conclusions and recommendations.

A. I find the following regarding the Applicants petition for ZECs for the second eligibility period:

- PSEG and Exelon have collected [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] from ZEC payments and associated interest for the first ZEC period. In this proceeding, PSEG and Exelon are seeking an additional $809 million from NJ ratepayers. Between the two ZEC eligibility periods, PSEG and Exelon are seeking [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] from New Jersey Ratepayers.

[1] N.J.S.A. 48:3-87.3 to -87.7.

- Even if the Board grants ZEC payments to the three plants, PSEG may still shut down the plants.
- PSEG's application understates future energy revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] over the next five calendar years for the three plants. On an energy year basis, I find that for the second ZEC eligibility period starting on June 1, 2022, the September 30th energy price forwards result in an aggregate increase in energy revenues of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] compared to energy revenues using the May 29th energy price forwards.
- For energy revenues, the Board should rely on recent or a time-series of recent energy price forwards that reflect the upward trends in energy price forwards. The Board should not rely upon the low energy price forwards provided by the Applicants.
- PSEG's application understates future capacity revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] million over the next five calendar years for the three plants with the use of capacity price projections that are too low.
- For capacity revenues, the Board should rely on capacity price proxies or capacity price projection used in other proceedings before the Board. Both the Basic Generation Supply ("BGS") proceeding and Offshore Wind Solicitation capacity price proxies are higher than capacity price proxies used by the Applicants.
- The Board should not discount the plants' expected capacity revenues because of concerns regarding the FERC's Minimum Offer Price Rule ("MOPR") because PSEG

assumes that the plants will continue to clear the PJM capacity market under MOPR. PSEG's estimates of the default offer floor prices for the three units are below PSEG's estimate for future capacity prices. If the Board rejects the ZEC applications, then MOPR will not apply to the plants.

- Combined, PSEG understates total energy and capacity revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] over the next five calendar years.
- The New Jersey Energy Master Plan demonstrates that New Jersey can meet its 2050 clean energy target with the orderly retirement of the three nuclear plants in an energy modeling scenario that only includes New Jersey's old offshore wind goal of 3,500 MW by 2035 rather than the more current offshore wind commitment of 7,500 MW.[2]
- The three nuclear units will likely benefit from the Biden Administration's potential future clean energy policies to meet the United States' renewed commitment to the Paris Climate Accords.
- While I do not think it is necessary for the Board to award ZECs to the three nuclear units, should the Board decide to award ZECs then the Board should use my social cost of carbon ("SCC") calculation of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] as the upper limit to any ZEC award. ZEC awards may be lower than my SCC value, but should not be higher.

[2] New Jersey Energy Master Plan. 2020. Page 275. *Available at* https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf

IV. Background on ZEC Act and First ZEC Eligibility Period

Q. Please describe the background of the ZEC Act with regards to the second eligibility period.

A. On May 23, 2018, Governor Phil Murphy signed into law the ZEC Act.[3] The Act requires the Board to create a program and mechanism for the issuance of ZECs for nuclear units. Each ZEC represents the fuel diversity, air quality, and other environmental attributes of one megawatt hour ("MWh") of electricity generated by eligible nuclear unit(s) selected by the Board.[4] The ZEC Act states that applicants need to provide to the Board:

> [C]ertified cost projections over the next three energy years, including operation and maintenance expenses, fuel expenses, including spent fuel expenses, non-fuel capital expenses, fully allocated overhead costs, the cost of operational risks and market risks that would be avoided by ceasing operations, and any other information, financial or otherwise, to demonstrate that the nuclear power plant's fuel diversity, air quality, and other environmental attributes are at risk of loss because the nuclear power plant is projected to not fully cover its costs and risks, or alternatively is projected to not fully cover its costs and risks including its risk-adjusted cost of capital.[5]

On December 19, 2018, the Applicants filed applications for Salem Unit 1 and Salem Unit 2 for the first three-year period starting June 1, 2019 through May 31, 2022. On April 18, 2019, the Board approved ZECs for all three units.[6]

Unlike the first proceeding, where the Board found that it had no authority to adjust the ZEC rate, the Board has an opportunity to review and adjust the ZEC charge to be lower than 0.0004/kWh in this proceeding. As stated in the Act:

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[3] Office of Governor Murphy. *Governor Murphy Signs Measures to Advance New Jersey's Clean Energy.* (May 23, 2018)(available at https://www.nj.gov/governor/news/news/562018/approved/20180523a_cleanEnergy.shtml)

[4] N.J.S.A. 48:3-87.3(3)(a)

[5] N.J.S.A. 48:3-87.3(3)(a)

[6] I/M/O the Implementation L. 2018 c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket Nos. EO18080899, EO18121338, EO18121339, and EO18121337 (Apr. 18, 2019).

> Notwithstanding the provisions of paragraph (1) of this subsection, and to ensure that the ZEC program remains affordable to New Jersey retail distribution customers, the board may, in its discretion, reduce the per kilowatt-hour charge imposed by paragraph (1) of this subsection starting in the second three year eligibility period and for each subsequent three year eligibility period thereafter, provided that the board determines that a reduced charge will nonetheless be sufficient to achieve the State's air quality and other environmental objectives by preventing the retirement of the nuclear power plants that meet the eligibility criteria established pursuant to subsections d. and e. of this section.[7]

On August 12, 2020, the Board established the application process for ZEC applications.[8] On October 1, 2020, the Applicants filed applications for Salem Unit 1 and Salem Unit 2 for the second three-year period, starting June 1, 2022 through May 31, 2025.

The ZEC Act states that the Board will select eligible nuclear units until the combined MWhs produced in the energy year immediately prior to the date of the enactment reaches 40 percent of the total MWhs distributed by the electric public utilities in the same energy year.[9]

V. Total Revenues Collected by the Three Plants

Q. Please summarize the historical revenues of the three plants.

A. Total revenues, including ZEC payments, received by the three plants in the last ten years through November 2020 are shown in the figure below:

[7] N.J.S.A. 48:3-87.5(j)(3)(a)

[8] I/M/O the Implementation L. 2018 c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants. BPU Docket No. 18080899 (Aug. 12, 2020).

[9] N.J.S.A. 48:3-87.5(g) (1).

[Begin PSEG Confidential]

[redacted]

[End PSEG Confidential]

In aggregate, the three units have generated **[Begin PSEG Confidential]** [redacted] **[End PSEG Confidential]** in revenues when excluding the ZEC payments for the Applicants. The figure shows a drop in total revenues that starts in 2014 and reaches a low point in 2016. As I discuss in more detail below, the PSEG energy revenue projections for the next five years show improved prospects relative to recent history. On a net income view, when including the reported fuel and non-fuel capital expenditures and operations and maintenance expenses, the historical net income for the three plants, through 2019, are shown in the figure below.[10]

[Begin PSEG Confidential]

[redacted]

[redacted]

[**End PSEG Confidential**]

By the net income metric, the Applicants reported negative net income in [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**]. The [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] from ZEC payments in 2019 allowed the three plants to report a net income of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] for 2019.

[10] PSEG's response to PS-Staff-0017 did not include expenses through November 2020.

In this proceeding, the Applicants claim that the same three nuclear units are at risk of becoming unprofitable without the ZEC over the next three-year eligibility period. Rate Counsel witness Andrea Crane addresses the merits of the cost components claimed by the Applicants. My analysis focuses on the revenues reported and projected by the Applicants.

VI. Revenue Components of the Three Plants

Q. Please describe the revenue components of the three plants.

A. In this section, I discuss three of the most significant components of revenue for the three plants. These include historical and projected ZEC payments, energy revenues, and capacity revenues. The plants receive ancillary and other revenues, but these revenues are generally less than [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] of total annual revenues for any given year.

A. Amount of ZECs Collected and Anticipated to be Collected from Ratepayers

Q. What amount has been and will be collected from ratepayers through ZEC payments?

A. Should the Board approve the second eligibility period ZEC applications for the three plants at the existing charge of $0.0004/kWh or $10/MWh, then the Board could be providing approximately [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] to the Applicants from ratepayers over the two ZEC periods.

Since April 2019, electric distribution companies ("EDCs") have collected approximately [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] through the "non-bypassable, irrevocable charge" for ZECs of $0.004/kWh on the electric utility retail distribution customers.[11] At the end of the first eligibility period (i.e., May 31, 2022), PSEG and Exelon will have received [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] in ZECs revenues in payments from New Jersey ratepayers and interest earned. These amounts are displayed in the figure below, by calendar year.[12]

[**Begin PSEG Confidential**]

[redacted]

[redacted]

[redacted]

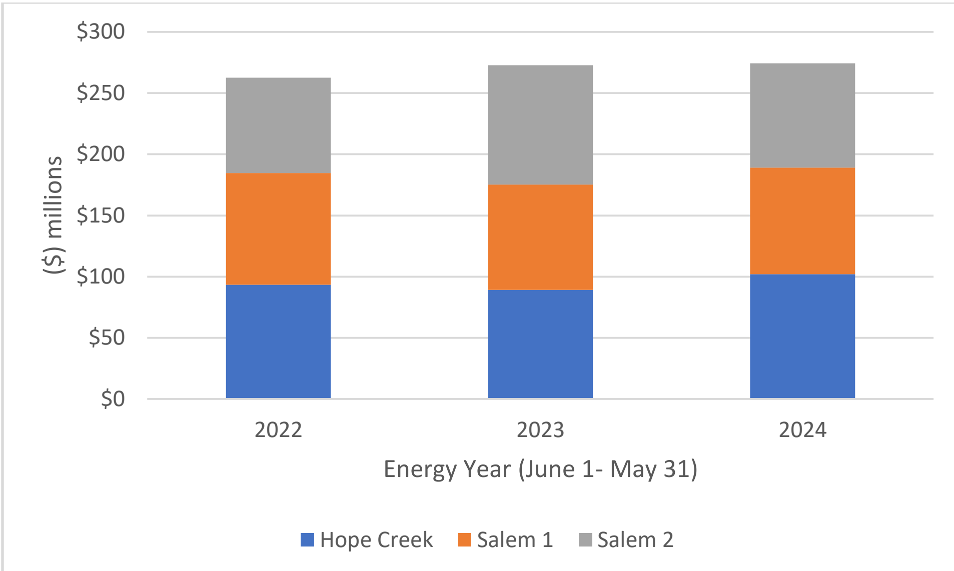
[End PSEG Confidential]

As part of the second ZEC application process, each unit provided an estimated rate impact analysis at the $10/MWh rate for the second ZEC eligibility period. I show the projected ZEC payments for all three plants in Figure 4 below. Unlike the previous figures, this one is presented by Energy Year (June 1st through May 31st).

[11] RCR-PS-HC-E-12, RCR-PS-S1-12, and RCR-PS-S2-12

[12] RCR-PS-HC-E-12. PSEG includes interest collected generated from the ZEC payments. On an energy-year basis, the revenues collected appear more evenly distributed (June through May).

Figure 4 Projected ZEC Payments Collected from Ratepayers for Second ZEC Period by Energy Year



Source:
HC-SSA_0002_ZEC Rate Class Impacts final.xlsx

If the Board were to approve a ZEC for a second eligibility period and at the full $10/MWh ZEC rate, then the Applicants will be able to collect approximately $809.5 million from ratepayers. Combined with the amounts collected from ratepayers in the first ZEC eligibility period, the total amount in ZEC payments could be as much as [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] for the three plants.

Q. Does PSEG consider ZEC payments sufficient to keep the plants operating?

A. It depends. While PSEG does not guarantee that, even if it receives the full ZEC payment for the second eligibility period, it will keep the plants operating, PSEG is not being forced to retire any of the three plants either. In the Company's 10-Q filing for the quarter ending September 30, 2020, the Company stated:

> [I]f all of the Salem 1, Salem 2 and Hope Creek plants are selected to continue to receive ZEC payments but the financial condition of the plants is materially adversely impacted by changes in commodity prices, FERC's changes to the capacity market construct (absent sufficient capacity revenues provided under a program approved by the BPU in accordance with a FERC-authorized capacity mechanism) … PSEG Power will take all necessary steps to cease to operate all of these plants. Ceasing operations of these plants would result in a material adverse impact on PSEG's and PSEG Power's results of operations.[13]

The statement suggests that New Jersey ratepayers could commit to pay nearly **[Begin PSEG Confidential]**[redacted] **[End PSEG Confidential]** to the Applicants without a firm commitment that the plants would continue to be in operation at the end of the ZEC eligibility period.

B. Energy Revenues

Q. Please summarize your findings regarding energy revenues of the three plants.

A. The Applicants understate projected energy revenues for the three nuclear plants. When I use updated energy price forwards provided by PSEG, I find that projected energy revenues for the three plants increase by [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] That roughly translates to an impact of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] based on projections of energy generation provided in this Application. In its application, PSEG estimates future revenues for the three plants for the next five years to be [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] based on energy price forwards from May 29, 2020. When using energy price forwards from September 30, 2020, I find projected

[13] Public Service Enterprise Group Incorporated. Form 10Q for the Quarterly Period Ended September 30, 2020, Page 79(available at https://s24.q4cdn.com/601515617/files/doc_financials/2020/q3/0883a31d-6c78-4a9e-928f-33e7b73a6455.pdf).

energy revenues for the three plants to be [**Begin PSEG Confidential**] [redacted]. [**End PSEG Confidential**]

Q. Please describe how PSEG estimated future energy revenues.

A. The Applicants base their projections of energy revenues on projections of energy price forwards that change over the year. The Applicants' initial projection of Energy Revenues for the three plants over the next five years (calendar and energy year) is presented below.

[Begin PSEG Confidential]

[redacted]

[End PSEG Confidential]

The table shows that the Applicants' initial projections for energy revenues for the next five calendar years result in a total energy revenue projection of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] billion, or an annual average of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] over the five-year period. On an energy year basis for the second ZEC eligibility period of June 1, 2022 through May 31, 2025, the total energy revenue projection is also approximately [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] billion. I note that the PSEG projected five-year annual average energy revenue is higher than the PSEG historical annual average (2016-2019) of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] million, but lower than the 2010-2019 annual average of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] million.

Q. What factor will influence energy revenue projections?

A. Energy revenue projections are sensitive to the Applicants' assumptions for energy prices in the PECO zone. The following table shows the PECO Zone forwards from the application filed in October, based on May 29, 2020 energy forwards and the PEC Zone forwards from September 30, 2020, as requested in Staff PS-0009.

[Begin PSEG Confidential]

[redacted]

[redacted]

[End PSEG Confidential]

Q. What is the impact of the change in energy price forwards on projected energy revenues?

A. Table 2 above shows that energy price forwards as of September 30, 2020 are higher than the May 29, 2020 energy price forwards used by the Applicants. The percent change in energy prices range from [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**]. I then multiplied the updated energy prices with PSEG's projected generation for the three plants to calculate updated energy revenue projections. The resulting annual and total difference in energy revenues between the May 29, 2020 and September 30, 2020 energy price forwards is shown below.

[Begin PSEG Confidential]

[redacted]

[End PSEG Confidential]

The September 30th energy price forwards result in an aggregate increase in energy revenues for the period 2021 through 2025 for the three units of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] compared to energy revenues using the May 29th energy price forwards. On an energy year basis the change in energy revenues over the next five energy years is [**Begin PSEG Confidential**] [redacted]

[**End PSEG Confidential**].[14] For the second ZEC eligibility period starting on June 1, 2022, the September 30th energy price forwards result in an aggregate increase in energy revenues of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] compared to energy revenues using the May 29th energy price forwards.

Q. What is your recommendation for the Board?

A. I recommend that the Board rely on more recent energy price forwards when evaluating future energy revenue projections for the three nuclear plants. It is clear that May 29, 2020 energy price forwards are out of date and understate future energy revenues for the three plants.

C. Capacity Revenues

Q. Please summarize your concerns regarding the Company's capacity revenues projections.

A. PSEG understated the capacity revenues attributable to the three plants. In its application, the Company assumed a forward capacity price of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] for the 2022/23 and 2023/2024 energy years. These assumptions are lower than the proxy capacity prices approved by the Board for the BGS auction.[15] When I change the values to the proxy price that represents the EMAAC zone, the capacity revenues for the three plants increase by [**Begin PSEG Confidential**] [redacted].**[End PSEG Confidential]** In addition, future actions by the Board to address the FERC MOPR order may result in

[14] The difference in projected energy revenues between calendar and energy year is partly due to the fact that the energy year prices include historical 2020 prices, since the 2020-21 energy year started on June 1, 2020.

[15] I/M/O the Provision of Basic Generation Service for the Period Beginning June 1, 2021. Docket No. ER20030190. Proposal for Basic Generation Service Requirements to be Procured Effective June 1, 2021. Page 12.

reducing uncertainty regarding future capacity revenues for the three plants. This is because the plants are likely to clear in the capacity market even with MOPR if New Jersey chooses to stay in the PJM capacity market. Alternatively, should NJ choose to exit the PJM capacity market, via a Fixed Resource Requirement ("FRR"), the plants will almost certainly receive capacity payments under that scenario as well,

as described in more detail below.

Q. Please describe the contribution of capacity revenues for the three plants.

A. Capacity revenues are the second largest component of the nuclear unit revenues. Historical capacity revenues as a percentage of total revenues for each of the three units for the last 10 years are presented in the following table:

[Begin PSEG Confidential]

[redacted]

Sources
Staff PS-0017

[redacted]

[End PSEG Confidential]

The figure shows that during the period from 2010 through 2018, or pre-ZEC, capacity revenues from the three units represented **[Begin PSEG Confidential]** [redacted] **[End PSEG Confidential]** of total revenues for the three units. In aggregate, the three units generated **[Begin PSEG Confidential]** [redacted] **[End PSEG Confidential]** between 2010 and 2018. With the advent of the first ZEC period, capacity revenues comprised approximately **[Begin PSEG Confidential]** [redacted] **[End PSEG Confidential]** of the units' revenues, amounting to [**Begin PSEG Confidential**] [redacted]. [**End PSEG Confidential**]

Q. What are the PSEG projections for future Capacity Revenues?

A. In response to ZECJ-FIN-13 (13b), PSEG provided its projections of future capacity revenues by calendar and energy year as summarized in the two tables below:

[Begin PSEG Confidential]

[redacted]

[redacted]

[End PSEG Confidential]

For the next five years, the three plants are projected to earn capacity revenues of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] on a calendar year basis or [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] on an energy year basis. The projected capacity revenues are based on the following capacity prices provided by PSEG:

[Begin PSEG Confidential]

[redacted]

[End PSEG Confidential]

For the three energy years that the Applicants are seeking ZEC payments, PSEG assumed a projected capacity price of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**]. The capacity price for the 2021/22 Energy Year is the EMAAC clearing price from the last Base Residual Auction ("BRA") held in May 2018.[16] For Energy Year 2025/2026, the year after the second ZEC eligibility period, PSEG assumes a capacity price of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential]**, an unexplained increase over the three-year prices.

Q. Are there capacity price proxy values accepted by the Board higher than the estimates provided by PSEG?

A. Yes, in the most recent BGS proceeding (BPU Docket ER20030190), the Board approved a capacity proxy price for suppliers to incorporate into their bids for the upcoming BGS auction.[17] The capacity proxy price for the 2022/23 and 2023/24 delivery years for the ACE, JCPL, and RECO zones are $152.06/MW-day and $146.51/MW-day respectively.[18] I note that PSEG's estimates for capacity revenues are based on EMAAC prices, even though the three nuclear units are classified under the PSEG zone. To be consistent with EMAAC prices, I use the capacity proxy values for the other EDCs, rather than the PSE&G proxy capacity prices of $162.13/MW-day and $166.64/MW-day. The BGS proxy capacity prices are [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] higher than the PSEG price for the 2022/2023 deliver year, and [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] higher than the PSEG price for the 2023/2024 deliver year. I extend the $146.51/MW-day BGS proxy capacity price for the 2024/25 delivery year as well.

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[16] PJM, *2021/2022 RPM Base Residual Auction Results*, *available at* https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2021-2022/2021-2022-base-residual-auction-report.ashx (last visited Jan. 27, 2021).

[17] BPU Docket No. EO20030203. Order November 18, 2020. Page 8. Available at http://www.bgs-auction.com/documents/BPU_Order_Approving_2021_Auction_Process_(November_18_2020).pdf

[18] Proposal for Basic Generation Service Requirements to be Procured Effective June 1, 2021. July 1, 2021. Page 12. Available at http://www.bgs-auction.com/documents/Front_Part_of_Filing_01_JUL_2020_(posted).pdf

Q. What are your adjusted capacity revenues when you use the BGS proxy capacity prices?

When I make these adjustments to the capacity price forecast, I arrive at an adjusted capacity revenue of the three plants that is [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] higher than the forecasted capacity revenues provided in the application for the 2021-2025 period. The table below shows the annual change in capacity revenues using the BGS proxy capacity price.

[**Begin PSEG Confidential**]

[redacted]

[End PSEG Confidential]

Thus, in their application, the Applicants appear to understate future capacity revenues by using a capacity price projection that is even lower than the BGS proxy capacity price approved for the upcoming BGS auction.

Q. Would you please comment on PSEG's suggestion that future capacity revenues are at risk due to the FERC MOPR?

A. Such risks are minimal, and this assessment is supported by PSEG's own analysis. PSEG believes that the three nuclear units will continue to receive capacity revenues with or without the FERC's MOPR in place.

Q. Please summarize the FERC's Minimum Offer Price Rule.

A. The MOPR sets price floors below which resources cannot offer capacity into the PJM Base Residual Auction, which determines capacity prices and obligations in the PJM capacity market. As originally established, the MOPR was designed to ensure that net buyers of capacity were not able to use market power to artificially drive down the capacity prices and distort the market. In December 2019, FERC ordered PJM to extend the MOPR to all new and existing capacity resources that receive state subsidies, including and specially referencing the New Jersey nuclear ZECs.[19]

Q. Are the nuclear units subject to the MOPR?

A. Currently, yes. Although the FERC order exempts most existing resources from the MOPR, [20] the exemptions do not apply to nuclear units. Thus, as long as the nuclear units receive ZECs, PSEG has indicated that it will be required to bid the avoidable cost rate at the MOPR floor prices for the three nuclear units.[21]

Q. Is it appropriate for the Board to consider risks related to the MOPR for the nuclear units?

A. No. Since the MOPR applies only to state-subsidized units, the MOPR will not apply if the units do not receive ZECs. The purpose of this proceeding is to determine whether the units require a state subsidy. This determination must be based on the units' profitability without ZECs (i.e., under circumstances where the MOPR would not create any risk for the Applicants).

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[19] The FERC's December 19, 2019 Minimum Offer Price Rule (MOPR) Order Docket Nos. EL16-49-000 and EL18-178-000 (Consolidated), Paragraph 8.

[20] For example: existing renewables, demand response, energy efficiency, storage resources, and self-supply resources (owned by vertically integrated utilities).

[21] HC-SSA-004

Q. Will the MOPR affect the nuclear units if they do receive ZECs?

A. This is unlikely. Based on PSEG's own analysis, it appears highly unlikely that the MOPR would cause the units to fail to clear the capacity market, even assuming they continue to receive ZECs.

Q. Would you please explain?

A. In March 2020, PJM submitted a compliance filing to FERC describing how it proposed to implement FERC's MOPR order.[22] The filing included illustrative net cost of new entry ("Net CONE") values for each resource type and avoidable cost rates for existing units. These values are used as each technology's floor price under the MOPR.[23] As part of its ZEC application, PSEG provided its estimate for the default offer floor price for the three units, which is summarized below:

Table 8 Assumed Default Offer Floor Price for Nuclear Units

	$/MW-day
Hope Creek	$68.36
Salem 1	$74.32
Salem 2	$74.29

Notes
HC-SSA-0004
S1-SSA-0004
S2-SSA-0004

These floor prices are lower than the capacity price forecast, provided by PSEG, of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**].[24] At the PSEG

22 PJM, *Compliance Filing Concerning the Minimum Offer Price Rule, Request for Waiver of RPM Auction Deadlines, and Request for an Extended Comment Period of at Least 35 Days.* (March 18, 2020)(available at https://pjm.com/directory/etariff/FercDockets/4443/20200318-er18-1314-003.pdf).

23 Whether FERC accepts these offer floors will affect the ability of renewable resources to participate in the RPM, as well as RPM clearing prices.

24 HC-ZECJ-FIN-14 Parts14andABC-Confidential.xls.

projected capacity price, all three units would clear the capacity auction since the PSEG capacity price is above the default offer floor prices.

Q. Is the Board's consideration of Resource Adequacy pertinent to this docket?

A. Should the Board approve a different capacity mechanism that benefits the three nuclear plants, the Board's action could further mitigate capacity market uncertainty for the three nuclear plants. The Board's Resource Adequacy docket is investigating the possibility of a load serving entity ("LSE") choosing to meet PJM's resource adequacy requirements through the FRR alternative to PJM's capacity market.[25] If the Board proceeds with an FRR alternative, then the FRR entity will provide the capacity revenues that otherwise would have been obtained from the PJM's capacity market. It is likely that a New Jersey specific FRR would also include the nuclear units.[26]

Q. What should the Board conclude about future capacity revenues?

A. My analysis indicates that the three nuclear units will continue to receive capacity payments. First, under MOPR, the three nuclear units' avoidable cost rate will continue to allow the units to clear the capacity auction, and thus receive capacity revenues from the PJM capacity market. Second, should if the Board rejects the ZEC applications, the units would not be subject to the MOPR and would presumably not need to bid at the MOPR default floor price. Finally, if the Board approves a FRR plan to exit the PJM capacity market, I would anticipate that a FRR plan would include the nuclear units.

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[25] BPU Docket No. EO20030203

[26] PSEG provided an overview presentation of a FRR approach on November 9, 2020. The presentation is available at https://www.nj.gov/bpu/pdf/ofrp/BPU%20FRR%20Presentation%20Nov092020.pdf

VII. Electric System Modeling Analysis

Q. Please summarize your findings regarding the electric system modeling analysis provided by the Applicants.

A. I find that the limited analysis window of three years constrains the possible options for generation mix for each retirement case. As a result, the increase in emissions associated with the retirement of the three nuclear plants is not surprising given the make-up of the existing generation mix and anticipated new resources. While emissions may rise in the near term due to nuclear units closing, New Jersey would still be able to meet its overarching 2050 climate goals.

Q. Please explain the connection between the Energy Master Plan modeling scenarios and the ZEC Application

A. The New Jersey Energy Master Plan ("EMP") modeled six scenarios outlining pathways for New Jersey to reach the 2050 target of 100% clean energy. In five of the scenarios, the modeling analysis maintained the three nuclear units through 2050.[27] In one scenario, Variation 5, the analysis phases the retirement of the three nuclear plants based on the license expiration for each of the three plants (Salem 1: 2036; Salem 2: 2040; and Hope Creek: 2046). Accordingly, the EMP modeling then phases out first Salem 1 at 1,170 MW, then Salem 2 at 1,170 MW and finally Hope Creek at 1,309 MW, for a combined total of 3,649 MW of nameplate capacity.

[27] The EMP modeling did not address intra-state subsidies such as the ZECs.

Q. Does Variation 5 achieve the State's Clean Energy target by 2050?

A. Yes, the modeling results for Variation 5 show that New Jersey can achieve the state's target with the scheduled retirements of the three nuclear plants.[28] As shown in the EMP, the state would still be able to achieve its 2050 emissions reduction goals without nuclear energy as modeled in Variation 5. I note that as part of the application, PSEG retained PA Consulting to conduct an analysis of the impact of retiring the nuclear plants on emissions and fuel diversity in New Jersey.[29] The PA Consulting report cites that the EMP's nuclear retirement scenario is $8 billion more than the EMP's least cost scenario.[30] I note that the nuclear retirement scenario only becomes more expensive than the least cost scenario starting in 2045, due to increased storage and offshore wind requirements, as shown in Figure Y of the EMP.[31] In fact, the EMP modeling for the Variation 5 scenario does not incorporate Governor Murphy's announcement to double the state's offshore wind target from 3,500 MW in 2035 to 7,500 MW by 2035.[32] Thus, the modeling inputs show 3,548 MW of offshore wind for 2035, not the 7,500 MW target.[33] Importantly, the difference in offshore wind in 2035 of 3,500 MW is almost equal to the nameplate capacity of 3,649 MW attributable to the three nuclear plants. The fact that an EMP modeling scenario that (1) assumes half of the installed offshore wind capacity target for the state in 2035, and (2) retires the nuclear units, still achieves the

[28] *2019 New Jersey Energy Master Plan Pathway to 2050.* 2020. Page 275. *Available at* https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf
[29] HC-ZECJ-ENV_0001_PA – PSEG – Nuclear Retirement Report_9-25-2020
[30] *Ibid*. page 13
[31] Energy Master Plan. Page 281.
[32] https://www.nj.gov/governor/news/news/562019/20191119b.shtml
[33] Evolved Energy Research. New Jersey 2019 IEP Technical Appendix. November 29, 2019. Figure 6: Installed capacity in New Jersey by type and year. Available at https://nj.gov/emp/pdf/New_Jersey_2019_IEP_Technical_Appendix.pdf

state's 2050 100% clean energy target goals indicates that the state does have options to meet its clean energy goals without the nuclear units.

VIII. Levitan Report

Q. Please summarize your findings of the January 19, 2021 Levitan & Associates preliminary reports on ZEC applications.

A. I concur with the report's findings that the energy and capacity revenues for the three plants are too low and should be adjusted upwards for the same reasons that I have stated in earlier sections of my testimony. I understand that Rate Counsel Witness Andrea Crane comments on the cost and risk aspects addressed in the Levitan & Associate preliminary reports ("Levitan Preliminary Reports") as well.[34]

Q. Are your findings regarding energy price forwards and energy revenues consistent with the Levitan Preliminary Reports.

A. Yes. The Levitan Preliminary Reports use forward energy prices dated December 31, 2020.[35] Footnote 6 of the Salem 2 report indicates that using energy price forwards from September 28, 2020 would not significantly alter the Levitan and Associates energy revenues findings.[36] The increase attributable to energy revenues in the Levitan Preliminary Reports is **[Begin Confidential]** [redacted] **[End Confidential]** for the three energy years versus my findings of **[Begin PSEG Confidential]** [redacted] **[End PSEG Confidential]** when using PSEG's values in response to Staff-PS-0007 and Staff-PS-0009. I have not had an opportunity to review the detailed calculations used in

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[34] The three Levitan & Associates reports collectively referenced are: (1) *Hope Creek Application Preliminary Report on Eligibility and Finances* Confidential Version, (2) *Salem 1 Application Preliminary Report on Eligibility and Finances* Confidential Version, and (3) *Salem 2 Application Preliminary Report on Eligibility and Finances* Confidential Version.
[35] *Salem 2 Application Preliminary Report on Eligibility and Finances* Confidential Version. Page 2.
[36] Ibid. Page 4.

the Levitan Preliminary Reports to confirm the increase in energy revenues. My analysis and the Levitan analysis do show that the energy price forwards have moved upwards, and that the energy forwards used by the Applicants are too low.

Q. Are your findings regarding capacity prices and capacity revenues consistent with the Levitan Preliminary Reports.

A. Yes, my analysis and the Levitan Preliminary Reports concur that the Applicant's assumptions for capacity revenue are too low. Where we differ is that the Levitan Preliminary Reports assume a capacity price of $170.64/MW-day for a project connecting to the PSE&G zone from the Board's second offshore wind solicitation guidance document.[37] I have used the BGS Auction proxy capacity price for the non-PSE&G zones to represent an EMAAC price. The increase in capacity revenues in the Levitan Preliminary Reports is **[Begin Confidential]** [redacted] **[End Confidential]** versus my findings of **[Begin PSEG Confidential]** [redacted]. **[End PSEG Confidential]** I use the EMAAC price since the PSEG reported capacity revenues are based on EMAAC prices, not the PSE&G zone prices. My analysis and the Levitan Preliminary Reports use Board approved capacity price proxies from other proceedings that are higher than the capacity price projection used by the Applicants. As a result, our analyses provide a capacity revenue projection that is more consistent with the Board's direction.

Q. What are your recommendations for the Board.

A. For energy revenues, the Board should rely on recent or a time-series of recent energy price forwards that reflect the upward trends in energy price forwards. The Board should

[37] *Salem 2 Application Preliminary Report on Eligibility and Finances* Confidential Version. Page 16.

not rely upon the low energy price forwards provided by the Applicants. For capacity revenues, the Board should rely on capacity price proxies or capacity price projection used in other proceedings before the Board. Both the BGS proceeding and Offshore Wind Solicitation capacity price proxies are higher than capacity price proxies used by the Applicants.

IX. Potential Policy Changes on Climate Change

Q. Please summarize recent changes at the Federal level that may impact the Board's consideration for ZECs in the second eligibility period.

A. On January 20, 2021, President Biden signed two executive orders that will have bearing in this proceeding. First, President Biden signed an executive order that allows the United States to re-enter the Paris Climate Accord, committing the United States to join the other 189 nations on a pathway to limit global warming by reducing global carbon emissions to 2 degree Celsius relative to pre-industrial levels.[38] During the campaign, then-candidate Biden issued a climate change plan that called for the United States' power sector to be carbon-free by 2035.[39] The plan explicitly states:

> It would also mean continuing to leverage the carbon-pollution free energy provided by existing sources like nuclear and hydropower, while ensuring those facilities meet robust and rigorous standards for worker, public, environmental safety, and environmental justice.[40]

Coupled with the re-entry of the United States into the Paris Climate Accord, it would be reasonable to assume that the new administration will refocus attention on new and existing carbon-free generation, including existing nuclear generation, and other carbon-

[38] https://www.whitehouse.gov/briefing-room/statements-releases/2021/01/20/paris-climate-agreement/
[39] https://joebiden.com/clean-energy/
[40] Ibid.

mitigation strategies. While the exact timing and nature of federal action on climate change is not known right now, the Biden administration's executive action could brighten the economic prospects of the three nuclear units. This would make it potentially unnecessary for the state to continue to support the nuclear plants in the second ZEC eligibility period.

Q. How should the Board consider recent federal actions?

A. The Board should consider that federal action on climate change to be forthcoming during the period of the second ZEC eligibility period. If so, then the Board should retain the ability to ensure that the nuclear plants are not being doubly compensated for their avoided carbon emission benefits either through the state ZECs or through some future federal response to meet the Paris Climate Accord.

X. Alternative ZEC Amount

Q. Please summarize your analysis of the Social Cost of Carbon analysis.

A. The Social Cost of Carbon ("SCC") is used to monetize the impact of carbon emissions. The value for the SCC depends on the scope of impact, the discount rate, and the health and environmental impacts of carbon emissions. Under the ZEC legislation, the ZEC program is structured to be "significantly less" than the SCC value of the carbon emissions avoided through the operation of the nuclear plants. [41] The specific language in the statute reads:

> The zero emission certificate program set forth in this act is structured such that its costs are guaranteed to be significantly less than the social cost of carbon emissions avoided by the

[41] N.J.S.A. 48:3-87.3 (1)(b)(8)

> continued operation of selected nuclear power plants, ensuring that the program does not place an undue financial burden on retail distribution customers. The social cost of carbon, as calculated by the U.S. Interagency Working Group on the Social Cost of Carbon in its August 2016 Technical Update, is an accepted measure of the cost of carbon emissions.[42]

Thus, the SCC value of the avoided carbon emissions may be considered an upper limit to the ZEC rate. To calculate the SCC value of the avoided emissions, I analyzed the following pieces of information.

- For the avoided emissions, I used the incremental in-state carbon emissions taken from the full retirement and the Hope Creek retirement scenarios from the PA Consulting report for the three-year modeling period starting on June 1, 2022 through May 31, 2025.[43]

- For the SCC, I use a cost of $46.60 per short ton in 2020 dollars, which is a conversion of the 2016 U.S. Interagency Working Group on the Social Cost of Carbon as referenced in the ZEC Act.[44] From the 2016 Working Group document, I took the 3% average value of $42/metric ton in 2007 dollars.[45] A more recent SCC was reported in the 2020 *Social Cost of Carbon* report by the United States Government Accountability Office, which reports $50 per metric ton in 2018 dollars and a 3 percent discount rate.[46] This value results in a SCC value of $46.51 per short ton (2020 dollars), which is very similar to the $46.60/per short ton from the ZEC legislation.[47]

- For the projected generation of the three units over the 2022 through 2025 period, I use information provided by the Applicants.[48]

[42] Ibid.
[43] ZECJ-ENV-0001
[44] N.J.S.A. 48:3-87.3 (1)(b)(8)
[45] Interagency Working Group on Social Cost of Greenhouse gases, United States Government. *Technical Support Document: - Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis- Under Executive Order 12866.* August 2016. Available at: https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf
[46] US Government Accountability Office. 2020. "Social Cost of Carbon." June. Available at: https://www.gao.gov/assets/710/707776.pdf, page 17
[47] *Application for Zero Emissions Certificates of Salem I Nuclear Power Plant*, Docket No. A-003939-18 (Sept. 18, 2019), page 53
[48] HC-GAIO-0007-Unit Generation-Confidential.

The resulting analysis in Table 9 shows the steps taken to calculate value of avoided emissions per megawatt-hour of generation over the second ZEC eligibility period.

[**Begin PSEG Confidential**]

[redacted]

[**End PSEG Confidential**]

Q. What are your recommendations for the Board with regards to the SCC.

A. As noted, I do not recommend that the Board award a ZEC. However, if the Board does award a ZEC in the second three-year period, I recommend that the Board use the SCC value of avoided emissions as the upper limit for ZEC payments for the continued operation of the three nuclear units from 2022 to 2025. My analysis indicates that the in-state value of avoided GHG emissions from not retiring the three units is [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] based on the PA Consulting report for avoided emissions, the 2016 SCC value, and projected generation from the three plants. This translates to a ZEC value of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] of nuclear generation over the second eligibility period.

Should the Board accept the findings of the Levitan Preliminary Reports, those subsidies that are lower than [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] should be used. For those unit(s) that require subsidies that are higher than the SCC value, the Board should limit the subsidy to the [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] value.

XI. Conclusions and Recommendations

Q. Please summarize your conclusions and recommendations.

A. I find the following conclusions and make the following recommendations.

- PSEG and Exelon have collected [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] from ZEC payments and associated interest for the first ZEC period. In this proceeding, PSEG and Exelon are seeking an additional $809 million from NJ ratepayers. Between the two ZEC eligibility periods, PSEG and Exelon are seeking [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] from New Jersey Ratepayers.

- Even if the Board grants ZEC payments to the three plants, PSEG may still shut down the plants.

- PSEG's application understates future energy revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] over the next five calendar years for the three plants. On an energy year basis, I find that for the second ZEC eligibility period starting on June 1, 2022, the September 30th energy price forwards result in an aggregate increase in energy revenues of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] compared to energy revenues using the May 29th energy price forwards.

- For energy revenues, the Board should rely on recent or a time-series of recent energy price forwards that reflect the upward trends in energy price forwards. The Board should not rely upon the low energy price forwards provided by the Applicants.
- PSEG's application understates future capacity revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] million over the next five calendar years for the three plants with the use of capacity price projections that are too low.
- For capacity revenues, the Board should rely on capacity price proxies or capacity price projection used in other proceedings before the Board. Both the BGS proceeding and Offshore Wind Solicitation capacity price proxies are higher than capacity price proxies used by the Applicants.
- The Board should not discount the plants' expected capacity revenues because of concerns regarding the FERC's Minimum Offer Price Rule ("MOPR") because PSEG assumes that the plants will continue to clear the PJM capacity market under MOPR. PSEG's estimates of the default offer floor prices for the three units are below PSEG's estimate for future capacity prices. If the Board rejects the ZEC applications, then MOPR will not apply to the plants.
- Combined, PSEG understates total energy and capacity revenues by at least [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] over the next five calendar years.

- The New Jersey Energy Master Plan demonstrates that New Jersey can meet its 2050 clean energy target with the orderly retirement of the three nuclear plants in an energy modeling scenario that only includes New Jersey's old offshore wind goal of 3,500 MW by 2035 rather than the more current offshore wind commitment of 7,500 MW.[49]

- The three nuclear units will likely benefit from potential Biden Administration's future clean energy policies to meet the United States' renewed commitment to the Paris Climate Accords.

- While I do not think it is necessary for the Board to award ZECs to the three nuclear units, should the Board decide to award ZECs then the Board should use my social cost of carbon ("SCC") calculation of [**Begin PSEG Confidential**] [redacted] [**End PSEG Confidential**] as the upper limit to any ZEC award. ZEC awards may be lower than my SCC value, but should not be higher.

Q. Does this conclude your testimony?

A. Yes, subject to additional information provided by the Applicants and testimony from other intervenors.

[49] New Jersey Energy Master Plan. 2020. Page 275. *Available at* https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf

ATTACHMENT MPC-1

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Environmental Health and Engineering, Newton, MA. *Senior Scientist*, 2001 – 2008.

Managed complex EPA-mandated abatement projects involving polychlorinated biphenyls (PCBs) in building-related materials. Provided green building assessment services for new and existing construction projects. Communicated and interpreted environmental data for clients and building occupants. Initiated and implemented web-based health and safety awareness training system used by laboratories and property management companies.

The Penobscot Group, Inc., Boston, MA. *Analyst*, 1994 – 2000.

Authored investment reports on Real Estate Investment Trusts (REITs) for buy-side research boutique. Advised institutional clients on REIT investment strategies and real estate asset exchanges for public equity transactions. Wrote and edited monthly publications of statistical and graphical comparison of coverage universe.

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In the Matter of the Application of
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