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December 19, 2018

VIA HAND DELIVERY

BOARD OF PUBLIC UTILITIES

Aida Camacho-Welch, Secretary
New Jersey Board of Public Utilities
44 South Clinton Avenue, Suite 314
P.O. Box 350
Trenton, New Jersey 08625-0350

DEC 18 2018

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Re: Application for the Receipt of Zero Emission Credits of Salem 2 Generating Station Submitted In the Matter of the Implementation of L. 2018, c.16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. E018080899

Dear Secretary Camacho-Welch:

PSEG Nuclear LLC ("PSEG") hereby submits this application,¹ along with an application fee of \$250,000 and a fully-executed "Agreement of Non-Disclosure of Information Claimed to be Confidential," for the receipt of Zero Emission Certificates ("ZECs") under the ZEC Act and pursuant to the Board of Public Utilities ("Board") November 19, 2018 Order regarding the ZEC program.² This application pertains to the Salem 2 nuclear generating plant, located in Lower Alloways Creek Township, New Jersey, owed 57.41% by PSEG and 42.59% by Exelon Generation Company, LLC ("Exelon Generation").³ As summarized below and as more fully set

¹ Instructions regarding how to access copies of the application submittals provided on electronic storage devices is being provided under cover of a separate letter.

² This letter supporting the Salem 2 plant application will be substantially similar in substance to the letter PSEG is submitting in support of the applications for the Hope Creek and Salem 1 plants.

³ As operator of Salem 2, 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

forth in the application, PSEG respectfully submits that the Salem 2 generating unit satisfies the criteria for the receipt of ZEC payments.

As demonstrated in the materials and certifications provided to the Board as part of this application, PSEG has determined that it will permanently close Salem 2 within three years, absent a material financial change, as this plant is not projected to cover the hundreds of millions of dollars in annual expenditures required for safe operation and the inherent risks of running a nuclear power plant. Since 2012, PSEG has retired generating units representing nearly 4,000 MW of installed capacity in New Jersey, and has committed to close its Connecticut coal plant in 2021. These retirement decisions, while often difficult for employees and communities, must and will be made in the normal course of business consistent with the best interests of shareholders.

The plants that PSEG has retired closed without much fanfare and without application to the State to take action to prevent their closure.⁴ The planned closure of Salem 2, however, stands out and requires attention. Salem 2 has over 21 years remaining on its NRC license and the New Jersey legislature has recognized that the loss of nuclear power plants relied upon by the residents of New Jersey would have “an immediate increase in air emissions within New Jersey.”⁵ New Jersey’s air quality would be seriously degraded due to “a substantial increase in

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 2 application.

⁴ New Jersey’s environmental community hailed PSEG’s decision to close its Mercer and Hudson coal-fired generation stations. See <https://www.northjersey.com/story/news/environment/2017/05/31/coal-power-plants/355425001/>

⁵ N.J.S.A. 48:3-87.3 (a)(9).

emissions of several serious pollutants, and associated adverse public health and environmental impacts”⁶ that disproportionately affects “the most vulnerable citizens of New Jersey including children, the elderly, and people living in poverty.”⁷ To avoid these harmful impacts, New Jersey created the ZEC Act as a safety net to protect New Jersey residents and included measures to ensure that ZEC payments will not be made unless needed to avoid closure. The Board has been entrusted with the task of reviewing applications submitted by nuclear plants to: (1) determine if the plants are eligible, and then (2) rank the eligible plants.

The ZEC Act requires the applicant to:

- demonstrate financial need via the submission of detailed financial information, including operation and maintenance expenses, fuel expenses (inclusive of spent fuel), non-fuel capital expenses, fully allocated overhead costs, and the cost of operational and market risks; and
- include a certification that the plant will cease operations within three years unless it experiences a material financial change.

With respect to Salem 2, the application and supporting documentation demonstrates that Salem 2 fully satisfies these statutory requirements. The Salem 2 plant will shut down absent a material financial change. Further, allowing nuclear plants like Salem 2 to close would directly conflict with New Jersey clean energy policy and likely prevent the State from meeting its clean air targets for reductions in pollutants.

The enclosed PA Consulting study also shows that the retirement of *any* of the PSEG plants - - Hope Creek, Salem 1, or Salem 2 - - let alone all of the plants, would result in

⁶ N.J.S.A. 48:3-87.3(b)(1).

⁷ N.J.S.A. 48:3-87.3 (a)(10).

degradations to fuel diversity and system resiliency. Specifically, the retirement of Hope Creek, Salem 1 and Salem 2, would result in greater reliance by New Jersey on gas-fired generation plants located in New Jersey and other portions of the PJM region. Residents would then be exposed to a higher risk of potential electricity outages associated with gas supply disruptions as well as higher costs associated with natural gas price spikes, particularly during extreme winter conditions when gas demand is high in order to meet residential heating needs.

I. In This Application, PSEG Transparently And Unequivocally Demonstrates That Salem 2 Faces Significant Financial Challenges That Will Result In Its Closure Unless It Receives ZECs

The Salem 2 plant has provided reliable and clean energy to New Jersey as a merchant power plant since 2000. However, the plant is now applying for ZECs because the desirable air quality and fuel diversity/resiliency attributes of its generation output are not valued in the market. As such, Salem 2 will cease to operate unless there is a material financial change. PSEG has actively sought to introduce efficiencies at the plant while recognizing the mandate of maintaining safe and reliable operations; however, these efficiency gains have not been enough.

While there has been some upward movement in clearing prices for electricity in 2018 due in large part to an unusually cold January, forward prices for energy remain low, regulatory and compliance costs remain high, and a comprehensive carbon abatement policy remains elusive. At the same time, other resource types – such as solar and wind – have received substantial payments for their desirable clean air attributes but nuclear generators, until very recently, have been ignored. Salem 2 and the other New Jersey nuclear plants cannot maintain operations unless they experience a material financial change. The ZEC Act was designed precisely to address this situation. The use of the ZEC program to preserve the operation of the

Hope Creek, Salem 1, and Salem 2 plants by compensating these plants for their contribution to air quality, fuel diversity, and resiliency is fully consistent with both the letter and the spirit of the ZEC Act.

Over the past few years, PSEG has foreseen significant financial challenges upcoming for Salem 2, for the reasons noted above. As discussed in greater detail below, consideration of the future of the Hope Creek, Salem 1 and Salem 2 units has received close scrutiny by the Board of Directors for Public Service Enterprise Group for a long time. PSEG also has advised its investors in its public Securities Exchange Commission (SEC) filings of the risks that the plants face and the potential closure. Enterprise's SEC 10-K filing for the year ending on December 31, 2016 states:

Low natural gas prices, as well as continuing costs for regulatory compliance and federal and state-level policies that provide credits to renewable energy such as wind and solar, but do not apply to nuclear generating stations, have been a contributing factor to the significantly reduced revenues from nuclear generating stations while simultaneously raising the unit cost of production. If these trends continue or worsen, our nuclear generating units could cease being economically competitive which may cause us to retire such units prior to the end of their useful lives.⁸

The trends identified in this passage have not abated, and PSEG intends to retire the plants within the next three years unless there a material beneficial financial change.

When the ZEC Act was being considered by the New Jersey Legislature, PSEG expressed willingness to open its books to the Board to demonstrate financial need for ZECs. The materials requested by the Board for the ZEC application do just that. The Board posed more than 70 questions or data requests, the majority of which relate to financial condition. PSEG has fully and completely answered each of the questions posed by the Board as to each of

⁸ Enterprise December 31, 2016 10-K, p. 28 (available in response to VII-SSA-9).

the three plants. The documents provide a historical presentation of the actual financial condition of the plant finances going back for five years where requested and as forecasted by PSEG through 2030 where requested.

II. PSEG Satisfies The “Financial Needs” Requirement Of The ZEC Act, And Certifies With Approval From Its Board Of Directors That Salem 2 Will Close Within Three Years Absent Material Financial Change

PSEG respectfully submits that the Salem 2 application unambiguously demonstrates financial need consistent with the ZEC Act standards. One of the alternatives identified in the ZEC Act to demonstrate financial eligibility for ZECs is that the projected revenues do not fully cover the projected costs and risks over the next three years absent a material financial change. As shown in greater detail in responses to the questions and data responses posed in the application template, Salem 2 is projected not to fully recover its costs and risks. In fact, even with the ZEC payment, projected revenues are inadequate to cover all costs and risks of the unit. Confidential materials provided in the applications, including, most notably, III-ZECJFIN – 6, amply support this analysis.

PSEG is also providing a certification for Salem 2, including a supporting resolution from the Board of Directors of Public Service Enterprise Group stating that, without a material financial change, Salem 2 will cease operations within three years (*see* response to V-SSA-1). The extensive financial demonstrations, coupled with the certifications of intent to retire the plants in the absence of a material financial change, clearly meet the statutory standard for demonstration of financial need.

Finally, while the Salem 2 application does not utilize the option allowed under the ZEC Act to employ “a risk adjusted cost of capital” to demonstrate its financial need, responses

prepared to certain of the questions posed in the application support that the plant would not be achieving a reasonable return under any conceivable standard of comparison. The past period returns calculated in the application, such as those shown in response to question GAIO-0018, reflect inadequate or negative returns, and the prospective results consistently reflect negative returns. No reasonable investor would see negative returns as attractive.

III. PSEG Amply Demonstrates That Salem 2 Satisfies The Environmental and Fuel Diversity/Resiliency Impacts Requirements, As Well As All Other ZEC Act Requirements

Salem 2 also meets the other eligibility requirements set forth in the ZEC Act as demonstrated in response to other questions and data requests. Specifically, Salem 2:

- is licensed to operate by the United States Nuclear Regulatory Commission beyond 2030 (*see* response to VII-SSA-2);
- makes a significant and material contribution to air quality in New Jersey (*see* response to IV-ZECJENV-1, 2);
- provides fuel diversity, air quality, and other environmental attributes that are at risk of loss without a material financial change (*see* responses to IV-ZECJENV-1, 2; VI-Mis-1);
- currently receives no payments or credits for fuel diversity, resilience, air quality, or other environmental attributes that would eliminate the need for ZECs (*see* response to VII-SSA-3); and
- includes the requisite application fee of \$250,000.

The bulleted eligibility demonstrations required by the ZEC Act are discussed in greater detail in responses to other questions or data requests; the most directly pertinent responses are noted. Supporting information accompanying this application includes detailed studies conducted by recognized industry experts – PA Consulting and ERM Consulting -- showing

impacts on air quality and fuel diversity/resilience.⁹ Computer modeling of re-dispatch scenarios and air dispersion impacts are included. These studies demonstrate that the retirement of all three or any one of the three plants would result in significant increases in CO₂, NO_x, SO₂, Hg, PM₁₀, and PM_{2.5}. All of these pollutants are harmful to humans and the degradation in New Jersey air quality would exacerbate health problems experienced by New Jersey residents. The ERM Consulting reports show that retirement of any of the plants would significantly hamper the ability of New Jersey to meet National Ambient Air Quality Standard standards for ozone and to meet carbon reduction targets under the New Jersey Global Warming Reduction Act. Moreover, because environmental impacts, particularly environmental impacts associated with ozone, are greatest in urban areas with larger populations of low-income residents, the loss of the Salem and Hope Creek nuclear plants would present environmental justice issues.

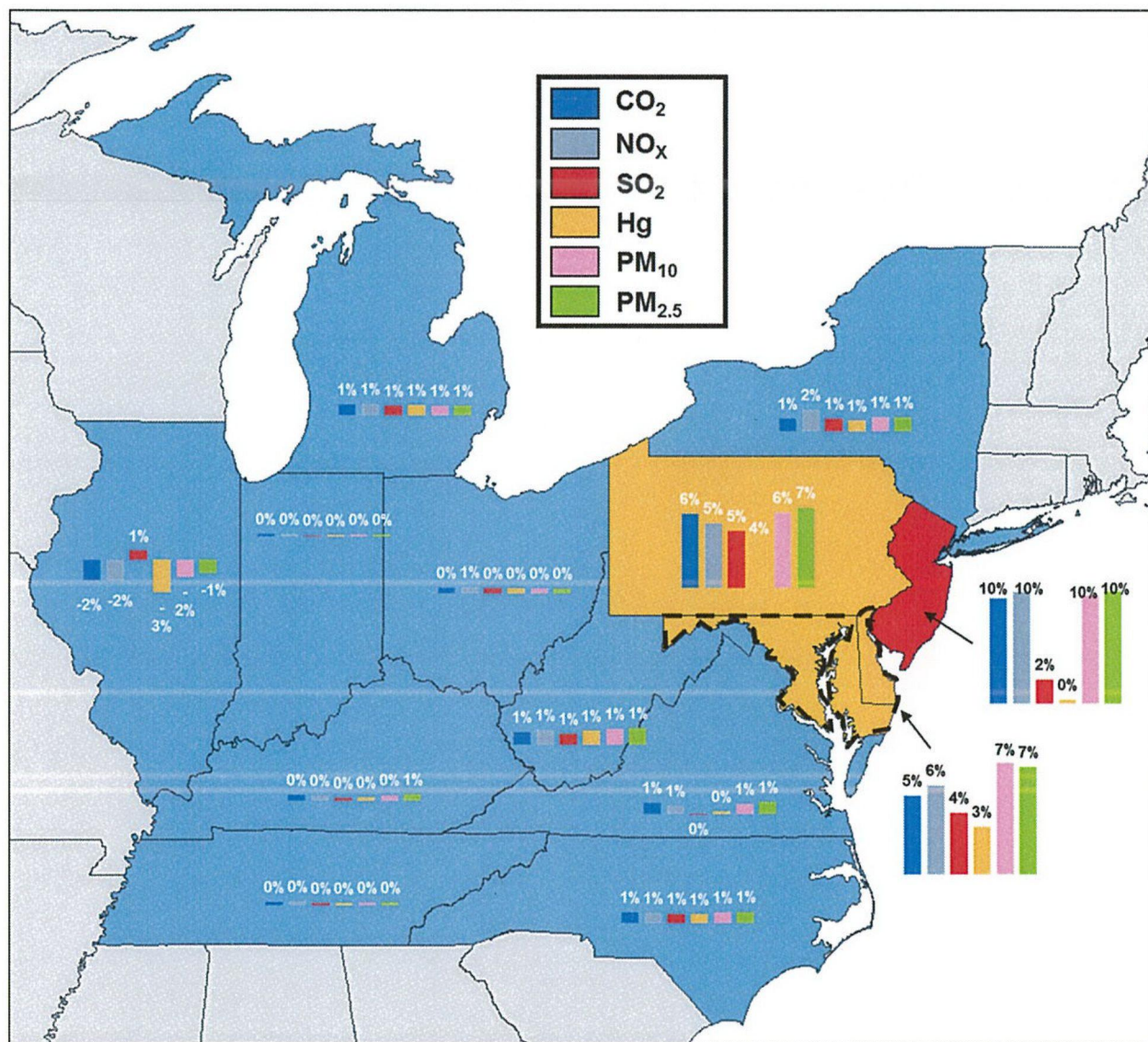
The chart below shows the impact of the nuclear plant retirements on New Jersey and adjacent states.¹⁰ It is based on PA Consulting's study which employed a widely-used power transmission and generation dispatch simulation model to determine the impact of retiring Hope Creek, Salem 1 and Salem 2. This model projects hourly power prices, energy flows, the expected development of new electric generating resources (including renewables), the expected retirement of existing electric generating resources, and the operating profiles of the electric generating resources (including dispatch, fuel consumption, and emissions). Modeled emissions were CO₂, NO_x, SO₂, Hg, PM₁₀, and PM_{2.5}. PA Consulting also calculated daily emissions of the modeled pollutants for typical summer weather and summer and winter peak days. The

⁹ These reports are available in the responses to IV-ZECJENV-1, 2.

¹⁰ PA Consulting Report (attached to Question VII-SSA-24, pp. 28).

following illustration based on the PA Consulting report shows the increases in pollutants produced in New Jersey and the increases in surrounding states most likely to affect air quality in the State:

**Increase in NJ, PA, and MD+DE+DC Emissions Across Study Period
– Retirement of Hope Creek, Salem 1 and Salem 2**



Undeniably, the adverse impacts on New Jersey represent a substantial degradation of air quality in the State. The impact of the retirement of Salem 2 or either of the other plants at the site, *i.e.*, Hope Creek or Salem 1, would be significant.

The loss of nuclear generation serving New Jersey cannot reasonably be addressed by renewable energy generation, at least at this time, as some have argued. To highlight this important point, Dr. Dean Murphy, a principal at the Brattle Group and an expert in electricity markets, testified at the October 11, 2018 ZEC public hearing that if the New Jersey nuclear plants were to retire, the electricity they would have produced, during the three-year period covered by the ZEC application process, would be replaced by almost entirely existing gas-fired and coal-fired generation units. He pointed out that New Jersey recently increased its Renewable Portfolio Standard, targeting 50 percent from renewables by 2030, which will require a tenfold increase in renewable energy production. Even if that ambitious rate of renewable growth were achieved, it would take 10 years, until 2028, to add enough new renewables to compensate for the lost nuclear generation. And after 10 years of extraordinary renewables buildout, New Jersey would be back where it started and emissions would be significantly higher during the intervening 10 years.¹¹ Forward progress to achieve actual reductions would be delayed for at least a decade. The loss of New Jersey's nuclear plants would mean that, even if the State's new

¹¹ An example of this concern can be seen in Germany, where the government voted to phase out the country's nuclear fleet over 10 years. When it came time to fill the nuclear energy void, the German government was forced to rely on coal – which has proven more expensive and more damaging to the environment than the mothballed nuclear plants.

renewables targets ultimately were realized, the State would experience a great increase in emissions rather than achieve substantial progress toward de-carbonization.¹²

It is undeniable that climate change is a paramount concern for New Jersey especially because New Jersey is a coastal state. A failure to address CO₂ emissions now could have devastating impacts on future generations of New Jersey residents and New Jersey's economy. The Hope Creek and Salem nuclear plants provide over 90% of the carbon free generation produced in New Jersey and will materially assist the State in effectuating a cost-effective transition to a zero carbon supply. The ERM Consulting study demonstrates that if any single unit retires or if all Salem and Hope Creek units retire, "achieving the 2020 GWRA limit is in jeopardy, and the backsliding upward trajectory of Electricity Generation Sector emissions does not position New Jersey well relative to achieving the 2050 GWRA limit."¹³

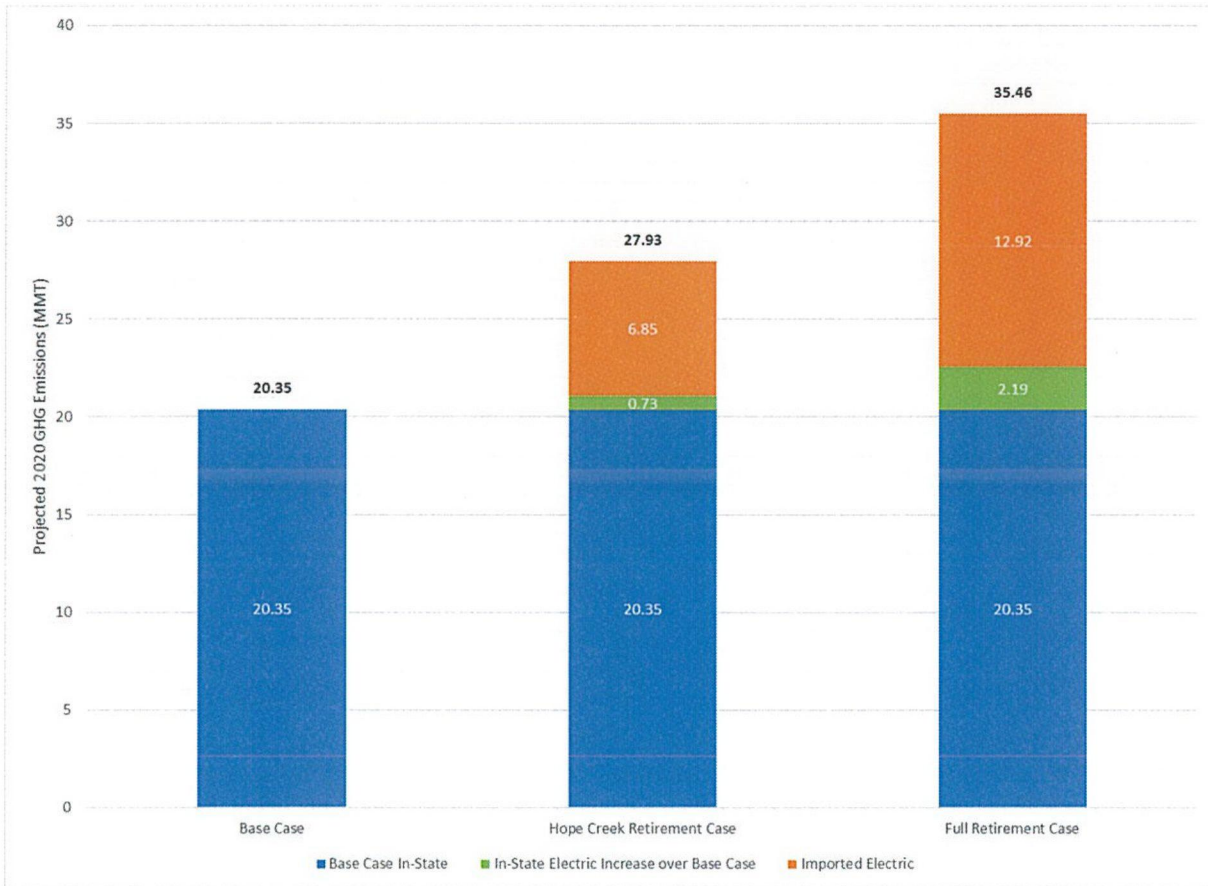
The chart below illustrates graphically the electric generation sector impacts associated with the retirement of the Salem and Hope Creek nuclear plants:¹⁴

¹² See Comments of Dr. Dean Murphy, Brattle Group, October 11, 2018 Hearing (New Brunswick), p. 68, l. 23 – p. 69, l. 1.

¹³ ERM Report on Impacts on GWRA, pp. 28-29.

¹⁴ ERM Report on Impacts on GWRA, pp. 11.

Projected 2020 Electricity Generation Sector GHG Emissions (MMT)



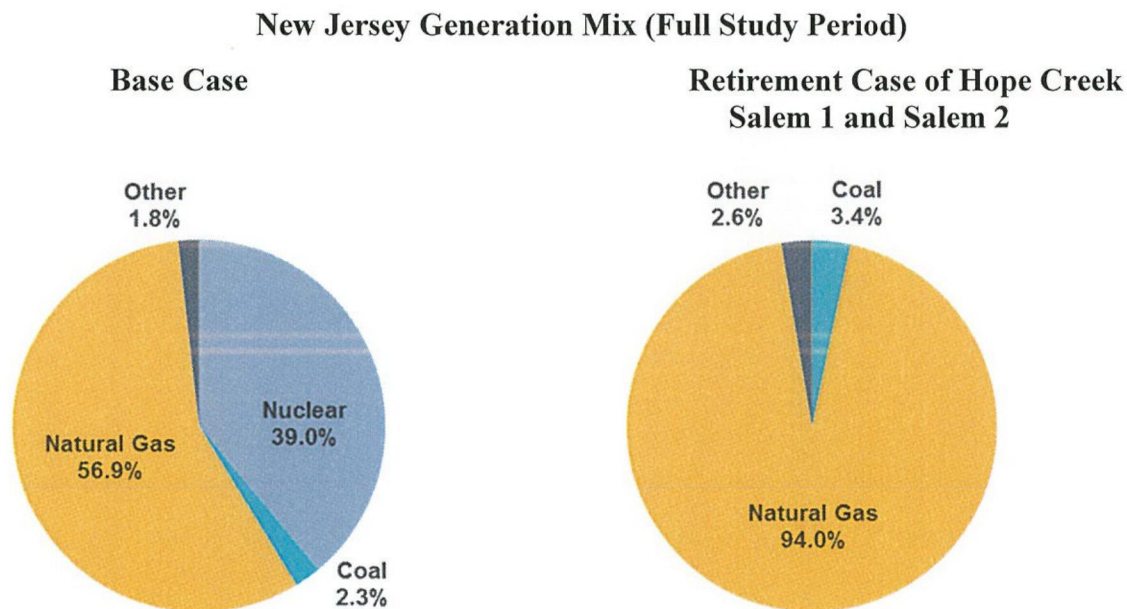
As seen in the chart, the retirement of any one plant – Hope Creek, Salem 1 or Salem 2 as individual units -- results in about a 40% increase in greenhouse gas emissions and, in the event of the retirement of all the units, an increase of about 75% results.¹⁵

The New Jersey nuclear units also provide significant diversity benefits. A recent example was demonstrated during the cold snap that occurred this past winter. The last week of December 2017 and the first week of January 2018 saw extreme low temperatures averaging 10 – 20 degrees below normal, resulting in high heating demand for natural gas and driving

¹⁵ Note that while the chart shows a “Hope Creek Retirement Case,” this is actually a proxy for the retirement of any one single unit at the site.

wholesale gas prices in New Jersey delivery zones to over \$100 per MMBtu for several days. At the end of this prolonged cold snap, New Jersey load was being supplied by in-state nuclear generators, a handful of normally gas-fired generators running on back-up oil which were running short despite on-going deliveries. Also supporting the State were transmission flows coming from out-of-state over heavily loaded interfaces. Had the Hope Creek and Salem nuclear units not been available, power prices would have increased significantly as in-state generators would have had to purchase gas to run, placing even more upward pressure on prices, and meeting demand would have been dependent on availability of this extremely high priced natural gas.

The charts below illustrate the impact of the nuclear plants retirement on New Jersey electric generation fuel diversity.¹⁶



¹⁶ PA Consulting Report (attached to Question VII-SSA-24, pg. 35).

These charts could hardly be starker in illustrating the impact of retiring Salem 1, Salem 2, and Hope Creek. The loss of the Salem and Hope Creek plants in total or individually dramatically increases New Jersey's reliance on gas-fired generation.

IV. The ZEC Act Protects New Jersey Consumers By Requiring Plants To Certify Annually That They Receive No Financial Relief From Other Sources, And Reducing ZEC Payments By Corresponding Amounts For Those Which Do Receive Such Financial Relief

The ZEC Act is designed to serve as a safety net for nuclear plants serving the State whose desirable air quality and fuel diversity attributes are at risk of loss because the plants face imminent retirement. But the ZEC Act was also clear that consumers should not make ZEC payments unless they are needed. In addition to the financial need demonstrations required at the initial application stage to receive ZECs and for each subsequent three-year period for units that seek ZECs, the ZEC Act also includes the requirement that a selected plant certify *annually* that it does not receive subsidies or grants for its environmental or fuel diversity/resiliency attributes that obviate the need for ZECs.¹⁷ Moreover, to the extent that a plant begins recovering payments related to its environmental or fuel diversity/resiliency attributes at *any* time after being selected, the ZEC payments are reduced immediately by such amount.¹⁸

The Board appropriately sought to address these provisions of the ZEC Act through application questions that request information regarding pending matters before Federal regulatory agencies such as the Federal Energy Regulatory Commission ("FERC") and the U.S. Department of Energy ("DOE"). PSEG agrees that the Federal regulators or the Regional

¹⁷ See N.J.S.A. 48:3-87.5 (e)(4).

¹⁸ See N.J.S.A. 48:3-87.5 (i)(3).

Transmission Organization, PJM Interconnection, L.L.C. (“PJM”), could potentially provide payments to for the Hope Creek and Salem plants to recognize the environmental, fuel diversity, and resiliency attributes these plants. To date, however, this has not occurred and the potential that these agencies or the RTO will act in a manner that would alleviate (or even reduce) the need for ZEC payments is speculative at best. In any event, if such payments are forthcoming in the future, New Jersey consumers are fully protected by the ZEC Act provisions discussed above.

V. Early Retirement Will Not Result In Any Shortfalls In Necessary Decommissioning Funds

A number of the questions in the application focus on the decommissioning costs and suggest that early retirement will result in shortfalls. This is not the case. The current level of the decommissioning trust fund for the plant is reported in VII-SSA 25.¹⁹ The level of these funds is fully consistent with expected need. As explained in the response to VII-SSA 26, there will not be any shortfalls in the event of early retirement.

PSEG’s decommissioning plans include the use of the “SAFSTOR” process. SAFSTOR is an approved approach by the Nuclear Regulatory Commission (“NRC”). In SAFSTOR, a nuclear plant is kept intact and placed in protective storage for an extended period of time. All fuel is removed from the reactor vessel and placed in fuel pools or dry storage on-site. The NRC continues to inspect the site and provides regulatory oversight of maintenance and security appropriate to the low risk profile of the site. The plant is dismantled once radioactivity has decayed to lower levels and the safety risk to workers is substantially reduced. The entire

¹⁹PSEG has supplied its most up-to-date NRC status report for decommissioning funds. This study is conducted triennially and a new one is currently under way.

process must be completed within 60 years of the plant ceasing operations. Given the current level of funds in the decommissioning trust and the time period for assets to grow enabled by SAFSTOR, it is expected that the funds will be sufficient to meet the projected decommissioning obligation.

VI. The ZEC Act Expressly Recognizes The Importance Of Applicants' Confidential Financial Information And Provides Safeguards For Such Information, And PSEG Has Exercised Great Care In Adhering To The Act To Sufficiently Protect Its Confidential Information

The ZEC Act reflects the Legislature's recognition of the importance of maintaining as confidential applicants' critical financial information, even superseding any other law that may authorize disclosure of such information. In addition to the Board's usual procedures for the identification and treatment of confidential materials (which the application materials follow), the ZEC Act has special provisions that need to be recognized. N.J.S.A. 48:3-87.5(a) provides that "financial and other information required pursuant to this subsection [for an applicant] may be submitted on a confidential basis and shall be treated and maintained as confidential by the Board and shall not be subject to public disclosure, notwithstanding any law to the contrary, including the common law."²⁰ The ZEC Act specifies that this information will only be made available to "essential parties" as designated by the Board and the State Attorney General Office. The Board's November 19, 2018 Order made findings that only two entities – Rate Counsel and the PJM Independent Market Monitor – should have this status. Accordingly, only these parties – along with Board staff and Board consultants – will be provided the information covered by N.J.S.A. 48:3-87.5(a), in accordance with the terms of the executed non-disclosure agreement.

²⁰ N.J.S.A. 48:3-87.5 (a).

Also, in conformance with the Board's directives, for Salem 1 and Salem 2, separate information as to Exelon Generation's ownership share is included as needed. In cases in which this information could be conveyed to PSEG, it has been incorporated into PSEG's Salem 1 and Salem 2 submittals for convenient reference.²¹ In other instances, in which the Exelon Generation information was deemed to be proprietary to Exelon Generation or, the disclosure of the information to PSEG could be injurious to competition or constitute a potential violation of the antitrust laws, Exelon Generation is submitting the information separately. All parties that receive confidential Exelon Generation information, and confidential PSEG information that the companies are providing separately should take care in any correspondence or other interactions with each company not to inadvertently disclose confidential information to the other co-owner, *i.e.*, do not disclose the confidential PSEG to Exelon Generation or the confidential Exelon Generation information to PSEG.

VII. PSEG Has Carefully Considered The Application Questions And Submitted Thorough, Detailed Responses That Will Enable The Board To Undertake A Comprehensive And Complete Review Prior To Issuance Of Any ZECs

The extensive set of application materials submitted by PSEG and Exelon Generation are fully responsive to the questions posed and materials requested by the Board in its November 19, 2018 Order. PSEG understands that the Board's staff and consultants, along with the intervenors and participants who have obtained leave to participate in the proceeding, will undertake a thorough review of the submitted materials and will probe the presentations made in the filings. PSEG is ready to engage in this process and is confident that the application will establish the

²¹ The information provided included confidential/market sensitive information in a few cases needed to fully answer certain questions. When this occurred, precautions were taken to assure compliance with anti-manipulation rules or potential anti-trust restrictions. The most sensitive information – particularly information regarding Exelon Generation's forecasts or bidding practices – was not supplied to PSEG.

eligibility of Salem 2 to receive ZECs under the ZEC Act. In addition, although the Board has not yet announced a mechanism for ranking plants, PSEG further believes that Hope Creek, Salem 1 and Salem 2, compared with any other potential applicants that could establish eligibility, would provide the best value to New Jersey residents for achieving the environmental and fuel diversity/resiliency benefits that the ZEC Act is intended to provide.

VIII. The Applications For Hope Creek, Salem 1 And Salem 2 Are Interdependent

The applications for all three plants are interdependent upon one another. As demonstrated by our submittals, beginning in April of 2016, the Enterprise Board of Directors periodically reviewed and discussed with management the outlook of the three nuclear plants. In 2018, the Enterprise Board requested an independent expert to provide an analysis of the economics of the plants under current market conditions and under various forecasted scenarios; this analysis was reviewed by the Enterprise Board in April of 2018. The Enterprise Board further reviewed a management report outlining decommissioning plans for the plants. In December 2018 the Enterprise Board authorized management to make application for ZECs. Finally, PSEG management and the Enterprise Board concluded that, absent a separate material financial change, the plants will cease operations within three years unless all three plants receive ZECs that adequately compensate the plants for their costs and risks.

Very truly yours,

A handwritten signature in blue ink, appearing to read "Joseph F. Accardo Jr." with a stylized flourish at the end.

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A handwritten signature in blue ink, appearing to read "Kenneth R. Carretta" with a stylized flourish at the end.

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