



("Butler") (collectively, "EDCs"). The Act identified the steps required to establish this program, including program logistics, funding, costs, application, eligibility requirements, selection process, and the timeframes for meeting several requirements of the Act.

The Act requires that, every three years, the Board shall complete a proceeding to certify applicant nuclear power plants as eligible for the program and establish a rank-ordered list of the nuclear power plants eligible to be selected to receive ZECs. N.J.S.A. 48:3-87.5(e)(1) through (5) specify the criteria for an applicant to be certified by the Board as an eligible nuclear power plant, including submission of an application fee to the Board in an amount to be determined by the Board, not to exceed \$250,000, to be used to defray the costs incurred by the Board to administer the ZEC program. Pursuant to N.J.S.A. 48:3-87.5(j), if the Board determines, in its discretion, that no nuclear power plant that applied satisfies the objectives of the Act, the Board shall be under no obligation to certify any nuclear power plant as eligible.

On August 29, 2018, the Board approved an Order initiating the creation of the ZEC program.<sup>1</sup> Through a series of Orders dated November 19, 2018, the Board approved the form of the ZEC applications, the program process, and the tariffs associated with collection of the funds.<sup>2</sup> On December 18, 2018, the Board approved the selection of Levitan & Associates, Inc. ("Levitan" or "LAI") to serve as a consultant to Board Staff ("Staff") and directed Staff to execute a contract for services.<sup>3</sup> On February 27, 2019, the Board approved the criteria established to rank eligible nuclear power plants for determination of how many of the eligible plants would receive ZECs without exceeding the cap established in the Act.<sup>4</sup> On April 18, 2019, the Board determined that

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<sup>1</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (August 29, 2018).

<sup>2</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (November 19, 2018) (Agenda Item 9A: Order Establishing the Program, Application, and Procedural Process; I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants and I/M/O the Application of Jersey Central Power and Light Company for Approval to Implement a Zero Emission Certificate ("ZEC") Charge and Tariff Page(s) Related Thereto in Support of the ZEC Program Authorized by N.J.S.A. 48:3-87.3 et seq. and a Board Order Initiating the ZEC Program, BPU Docket Nos. EO18080899 & EO18091002 (November 19, 2018) (Agenda Item 9C); I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants and I/M/O the Application of Atlantic City Electric Company for Approval to Implement a Zero Emission Certificate ("ZEC") Charge and Tariff Page(s) Related Thereto in Support of the ZEC Program Authorized by N.J.S.A. 48:3-87.3 et seq. and a Board Order Initiating the ZEC Program BPU, Docket Nos. EO18080899 & EO18091003 (November 19, 2018) (Agenda Item 9D); I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants and I/M/O Public Service Electric and Gas Company's Request for Approval of a Zero Emission Certificate Recovery Charge, BPU Docket Nos. EO18080899 & EO18091004 (November 19, 2018) (Agenda Item 9E); I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants and I/M/O Rockland Electric Company's Filing for Review and Approval of the Zero Emission Certificate Recovery Charge, BPU Docket Nos. EO18080899 & EO18091005 (November 19, 2018) (Agenda Item 9F); I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants and I/M/O the Application of Butler Electric Utility for Approval to Implement a Zero Emission Certificate ("ZEC") Charge and Tariff Page(s) Related Thereto in Support of the ZEC Program Authorized by N.J.S.A. 48:3-87.3 et seq. and a Board Order Initiating the ZEC Program, BPU Docket Nos. EO18080899 & EO18091018 (November 19, 2018) (Agenda Item 9G).

<sup>3</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (December 18, 2018).

<sup>4</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate

the Hope Creek Nuclear Generating Plant (“Hope Creek”) was eligible for the ZEC program and that they would receive ZECs in accordance with the Act.<sup>5</sup> Consequently, the Board directed the EDCs to submit final tariffs consistent with the Board’s Order, effective April 18, 2019. The Board further directed Staff to return to the Board by July 31, 2019 with recommendations on the program’s continued and forward implementation.

The Board accepted Staff’s recommended ZEC pricing methodology for the initial “stub period” between April 18 and May 31, 2019 in its July 10, 2019 Order.<sup>6</sup> The Board also directed the EDCs to purchase the number of ZECs in accordance with the Act and the July 10, 2019 Order and to make payments to the generators by August 30 in the years 2019, 2020, 2021, and 2022; directed the owner(s) of each selected nuclear power plant to submit a signed and certified notification of continued operations to the Board by July 30 of 2020 and 2021 during the initial eligibility period (June 1, 2019 – May 31, 2022) in accordance with the Act and the July 10, 2019 Order; directed the owner(s) of each selected nuclear power plant to submit a personnel plan by April 18, 2021; and directed the owner(s) of each selected nuclear power plant to submit to the Board by July 30 of each year that the nuclear power plant is eligible to receive ZECs and a lay-off certification that no employees have been laid off by the nuclear power plant except for reasons enumerated in the Act. Additionally, the Board agreed that the ten-year ZEC efficacy study requirement be revisited after completion of the first ZEC eligibility period.

The Board also agreed with Staff about the need for a stakeholder process to solicit additional comments, recommendations, and input on the various aspects of continued implementation of the ZEC program. The Board directed Staff to implement the stakeholder process and return to the Board with recommendations for an updated ZEC application, as well as updated eligibility and ranking criteria applicable to nuclear power plants seeking to demonstrate eligibility to the Board for the second eligibility period. On May 20, 2020, the Board approved Staff’s recommendations on future ZEC program requirements and timelines. The Board approved Staff’s modifications to the application that the Board has used as part of the process to determine which, if any, nuclear power plants will be eligible to receive ZECs during the next three-year eligibility period. Staff recommended releasing the application for public comment prior to its finalization, which the Board approved. The Board also directed Staff to hire a consultant to aid in the analysis of the modification of the ZEC charge, as set forth at N.J.S.A. 48:3-87.5(j)(3).<sup>7</sup>

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Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (February 27, 2019). In this second ZEC eligibility period, three applications were received, and Staff applied the ranking criteria. The combined output of the plants would be lower than the statutory 40% cap of electricity sold by the state’s EDCs, meaning that each eligible applicant would be selected to receive ZECs under the statute no matter their ranking. See N.J.S.A. 48:3-87.5(f); (g)(1).

<sup>5</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants; Application for Zero Emission Certificates of Salem 1 Nuclear Power Plant; Application for Zero Emission Certificates of Salem 2 Nuclear Power Plant; Application for Zero Emission Certificates of Hope Creek Nuclear Power Plant, BPU Docket Nos. EO18121338, EO18121339, & EO18121337 (April 18, 2019) (In addition to Salem 1, the Order also determined the eligibility of the Salem 2 and Hope Creek Nuclear Generators to receive ZECs).

<sup>6</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket Nos. EO18080899, EO18121338, EO18121339, EO18121337 (July 19, 2019).

<sup>7</sup> Pursuant to N.J.S.A. 48:3-87.5(j)(3), starting in the second three-year eligibility period and for subsequent three-year eligibility periods thereafter, the Board may reduce the non-bypassable, irrevocable per kilowatt-hour charge (“ZEC charge”) imposed on electric public utilities’ retail distribution customers pursuant to N.J.S.A. 48:3-87.5(j)(1) if the Board determines that the charge will be sufficient to prevent the retirement

Staff issued the draft application on July 1, 2020 for public comment and accepted written comments through July 20, 2020.

## II. PROCEDURAL HISTORY FOR THE SECOND ELIGIBILITY PERIOD

On August 12, 2020, the Board established the application process for the second eligibility period (June 1, 2022 – May 31, 2025), and ordered that the application period be open and remain open until October 1, 2020 (“August 12, 2020 Order”).<sup>8</sup> The Board directed applicants wishing to participate in the second eligibility period to submit an intent to file by August 19, 2020. Further, the Board directed persons wishing to obtain access to confidential information during the proceeding to submit their requests to the Board by August 26, 2020, and for any entities opposing such requests to submit their letters or briefs in opposition to the request by September 2, 2020. Lastly, the Board designated President Joseph L. Fiordaliso as the Presiding Commissioner for these second eligibility proceedings.

On August 19, 2020, the Board received notices of intent to file applications for issuance of ZECs for three nuclear power plants. PSEG Nuclear, LLC (“PSEG Nuclear”) and Exelon Generation, LLC (“Exelon”) submitted an intent to file for their jointly owned Salem 1 (“Salem 1”) and Salem 2 Nuclear Generating Plant (“Salem 2”), and PSEG Nuclear submitted an intent to file for the Hope Creek Nuclear Generating Plant.<sup>9</sup> Each application was individually docketed.<sup>10</sup>

On September 10, 2020, President Fiordaliso issued a Prehearing Order establishing a procedural schedule and extending the deadline to file Requests for Access to Confidential Information to September 16, 2020, and extending the deadline to file any opposition thereto or support thereof to on or before September 22, 2020.<sup>11</sup> On September 15, 2020, President Fiordaliso further extended these deadlines to September 21, 2020, and September 25, 2020, respectively.<sup>12</sup>

The Board received Motions to Intervene from Public Service Electric and Gas Company (“PSE&G”), the Independent Market Monitor for PJM (“IMM”), the New Jersey Large Energy Users Coalition (“NJLEUC”), and the PJM Power Providers Group (“P3”). PSEG Nuclear submitted opposition briefs to the motions submitted by NJLEUC and P3. By a Procedural Order dated September 29, 2020, President Fiordaliso granted access to confidential information to the

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of eligible nuclear power plants.

<sup>8</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (August 12, 2020) (Agenda Item 9A).

<sup>9</sup> Salem 1 and 2 are located on the same site as Hope Creek in Hancocks Bridge, Lower Alloways Creek Township, in Salem County New Jersey. Salem 1 and 2 are operated by PSEG and are jointly owned by PSEG (57.41%) and Exelon (42.59%). PSEG Nuclear owns 100% of Hope Creek.

<sup>10</sup> As all three units were provided with separate docket numbers, Salem 1 and Salem 2, docket numbers ER20080557 and ER20080558, respectively, will be addressed in separate Orders. Exelon submitted the applications for the Salem units jointly with PSEG Nuclear and submitted separately supplemental information not shared with PSEG Nuclear.

<sup>11</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Order Setting a Procedural Schedule, BPU Docket No. ER20080559 (September 10, 2020).

<sup>12</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Order - Motions to Intervene and Participate and Access to Confidential Information, BPU Docket No. ER20080559 (September 15, 2020).

Division of Rate Counsel (“Rate Counsel”) and the IMM; granted Intervenor Status to the IMM, NJLEUC, and P3; and granted participant status to PSE&G.<sup>13</sup>

On October 14, 2020, the Board approved the selection of Levitan to serve as the consultant to Board Staff for the second eligibility period.

On December 18, 2020, President Fiordaliso issued a Prehearing Order on Schedule, Outstanding Issues and Evidentiary Hearing that set forth a process for the parties to submit the testimony of up to two witnesses, submit written cross examination questions for and responses to each other, and hold an evidentiary hearing for the Board to ask questions. President Fiordaliso also approved an application for admission *pro hac vice* for Jeffery Mayes, Esq. representing the IMM. Lastly, the Order included an amended procedural schedule. The Order set a deadline of February 16, 2021 for the parties to issue cross-examination questions for the second eligibility period with responses due on February 26, 2021. The schedule established March 19, 2021 as the deadline for submission of public comments and set a briefing schedule with initial briefs due March 26, 2021 and reply briefs due April 9, 2021.<sup>14</sup>

On January 19, 2021, Board Staff, in conjunction with Levitan, released preliminary eligibility reports for each applicant nuclear unit which included a finding that the Hope Creek application was administratively complete as required by the December 18, 2018 ZLEC Order.<sup>15</sup> Additionally, each report contained a preliminary economic evaluation for each nuclear unit regarding whether or not that unit will not fully cover its costs and risks, as defined by the Legislature in the ZEC Act, for the second eligibility period.

On January 29, 2021, the Board received written direct testimony. PSEG submitted testimony from two witnesses: Daniel Cregg, Executive Vice President and Chief Financial Officer for Public Service Enterprise Group (“PSEG”) and its subsidiaries, including PSEG Power and PSEG Nuclear LLC, the co-owner and operator of the Salem 1 and Salem 2 plants, and Carl Fricker, Vice President - Power Operations Support for PSEG Power, LLC (“Power”), parent of PSEG Nuclear LLC. The Division of Rate Counsel offered the testimonies of Andrea Crane, President of The Columbia Group Inc. and Maximilian Chang of Synapse Energy Economics. Monitoring Analytics, LLC, serving as the IMM for PJM,<sup>16</sup> submitted as testimony its report entitled *Analysis of NJ Zero Emissions Certificate (ZEC) Applications*. Intervenor NJLEUC and P3 filed no testimony.

On February 1, 2021, the Board conducted two virtual public hearings on the second eligibility period. The January 15, 2021 Notice of Public Hearings posted on the Board’s website for these hearings also invited electronic or mailed submission of public comments to be submitted by February 12, 2021.

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<sup>13</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Order Ruling on Motions to Intervene and Participate, Admission Pro Hac Vice, and Access to Confidential Information, BPU Docket No. ER20080559 (September 29, 2020).

<sup>14</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Prehearing Order on Schedule, Outstanding Issues, and Evidentiary Hearing, BPU Docket No. ER20080559 (December 18, 2020).

<sup>15</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, Order Approving Consultant and Setting Application Fee, BPU Docket No. EO18080899, (December 18, 2018) (Agenda Item 9A).

<sup>16</sup> PJM refers to the Pennsylvania, Jersey, Maryland Power Pool.

On February 25, 2021, President Fiordaliso issued a Prehearing Order on Scheduling, Prehearing Conference, and *Pro Hac Vice* Motion establishing a pre-evidentiary hearing date of March 2, 2021, and extended the deadline for written responses to cross examination questions to March 1, 2021.<sup>17</sup> Orders for Salem 1 and Salem 2 further approved the application of Exelon to admit Alexander w. Judd, Esq. *pro hac vice* to represent them. President Fiordaliso additionally issued a Prehearing Order on March 4, 2021 detailing the specifics for the evidentiary hearing, and approved the application by PSEG Nuclear for the *pro hac vice* admittance of Matthew Price, Esq.<sup>18</sup>

On March 8, 2021, President Fiordaliso conducted a virtual evidentiary hearing regarding the second eligibility period applications, with the full Board participating and the public provided the ability to live stream the hearing. Presented for cross-examination were the following: PSEG witnesses Daniel Cregg and Carl Fricker; IMM witness Dr. Joseph Bowring; Rate Counsel witnesses Andrea Crane and Maximilian Chang; and Board Staff LAI witness Seth Parker. Exelon, NJLEUC, and P3 participated in the evidentiary hearing but did not present any witnesses.

### III. PUBLIC HEARINGS AND WRITTEN COMMENTS

In a public notice issued on January 15, 2021, the Board solicited comments from stakeholders regarding the ZEC applications submitted by PSEG Nuclear and Exelon. The notice invited members of the public to attend and present their views at two virtual public hearings on February 1, 2021 with President Fiordaliso presiding. In addition to staff and counsel for the parties, the meetings were well attended, with 13 to 20 participants per meeting.

Numerous organizations provided feedback against the program as established by the Legislature. Rate Counsel spoke, stating that the applicants have failed to establish that they are entitled to ZECs under the eligibility requirements of the statute. Rate Counsel claimed that the proposed methodology inflates the cost of operating and understates the revenues that PSEG and Exelon plan to recover from the three nuclear units. Additionally, Rate Counsel urged the Board to take into consideration the new administration in Washington D.C., as well as the pandemic, and deny the applications. Joseph Bowring, Market Monitor for PJM, also stated that PSEG had not met the standard required to receive the ZEC subsidy, arguing that PSEG's applications understate revenues, overstate costs, and misstate risk. AARP spoke, arguing against the applications, stating that now is not the time to approve corporation requests to pile on almost a \$1 billion rate hike as many of AARP's members are on low or fixed incomes.

A number of entities were in favor of the program. PSEG, Exelon, New Jersey Alliance for Action, President of Salem Community College, Chamber of Commerce Southern New Jersey, Engineers Labor Employer Cooperative Local 825, the Brattle Group, New Jersey State Chamber of Commerce, ERM, Clean Energy Task Force, New Jersey Building and Construction Trades Council, Hispanic Chamber of Commerce in New Jersey, New Jersey Energy Coalition, Nuclear Energy Institute and others all spoke in favor, or authored comments in support, of the applications, asserting that the plants are a vital part of the State's economy. As part of their comments, the Brattle Group asserted that approximately 1600 full-time employees of the plants

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<sup>17</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Prehearing Order on Scheduling, Prehearing Conference, and Pro Hac Vice Motion, BPU Docket No. ER20080559 (February 25, 2021).

<sup>18</sup> I/M/O the Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program – Hope Creek, Prehearing Order, BPU Docket No. ER20080559 (March 4, 2021).

in Salem, and 4500 employees statewide, would be left unemployed if the plants were to shut down. Additionally, several environmental groups argued that the nuclear plants are needed to meet New Jersey's climate goals and shutting down the plants would undermine and be contrary to the State's clean energy goals.

In response to the request for written public comments, the Board received 29 written comments supporting the applications and seven comments opposing the applications.<sup>19</sup> Reasons given for supporting ZECs focused on the importance of nuclear plant operations to jobs and the economy, with fears expressed that plant closures would cripple the regional economy. Some argued the potential plant closures would damage the region's environment, and raised issues of environmental justice related to increased greenhouse emissions and ozone impacting low-income communities. Others argued for the preservation of a diverse generation mix that is essential to reducing the risk of power grid failures. Water utility companies affirmed that the state's utilities are interdependent and warned that nuclear plant closures would shift the state's energy dependence almost entirely to natural gas, rendering PSEG vulnerable to price fluctuations impacting large energy users with already high electric utility costs. Those arguing in favor of awarding ZECs also argued that continued operation of the nuclear units would support the ramp-up of electric vehicle use with emission-free energy to enable a truly clean transportation alternative. Commenters stated the "\$10/MWh ZEC remains a least-cost way to preserve clean affordable generation in New Jersey." ZEC subsidy supporters highlighted that "the value of the public benefits to climate, public health, and local economies far outweighs the cost of the ZEC subsidy", and "the long-term costs from unabated climate change will be far greater than cost of ZECs to achieve the state's energy goals."

In contrast, opponents of awarding ZECs to eligible applicants under the Act asserted that the ZEC subsidy imposes "an unnecessary and unfair nuclear tax on every residence and business in New Jersey" and highlighted the impact of high rates on the economic condition of New Jersey's "most vulnerable residents including those on low or fixed incomes" who are already "suffering under the weight of New Jersey's high energy costs." Other opponents argued that ZEC subsidies hurt competition and competitive markets by "distorting the wholesale electricity market" and "selecting winners and losers" rather than allowing the market to decide, thus putting ratepayers "on the hook for potentially uneconomic power plants." Opponents also complained that under the Act as enacted by the Legislature that the market was "restructured to shift risk away from ratepayers and that objective is frustrated by the requested subsidy." Commenters argued that New Jersey is best served by having competitive electricity markets operating free and clear of out-of-market payments and ratepayer subsidies and claimed that consumers benefit when market participants compete on a level playing field based on market principles and least cost economics. Opponents stated that the Board should leave the viability of the nuclear plants to the market rather than obligating ratepayers "to provide three more years of handouts." Finally, ZEC

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<sup>19</sup> The Center for Climate and Energy Solutions, Clean Air Task Force, Chamber of Commerce Southern New Jersey, Edison Electric Institute, Engineers Labor-Employer Cooperative, Environmental Resources Management, IBEW Third District, IBEW Local Union 94, Lower Alloways Creek Township (Office of the Mayor), Middlesex Water Company, New Jersey Alliance for Action, New Jersey American Water Co., New Jersey Building and Construction Trades Council, New Jersey Utility Shareholders Association, North Bridge Group, Nuclear Energy Institute, PA Consulting Group, PSEG Nuclear LLC, Puerto Rican Action Committee of Southern New Jersey, Ranch Hope, Salem Community College, Salem County Board of County Commissioners, Salem County Chamber of Commerce, Statewide Hispanic Chamber of Commerce of New Jersey, The Brattle Group, and Third Way and three individuals filed comments supporting ZECs while AARP New Jersey, American Petroleum Institute, and five individuals filed comments opposing ZECs.

objectors wrote that “consumers should not bear the burden that rightfully belongs to shareholders who reap the profits.”

#### **IV. POSITIONS OF THE PARTIES**

The December 18, 2020 Order established a briefing schedule for the parties to this case to submit their positions in brief form on March 26, 2021, with reply briefs due on April 9, 2021. The Board received briefs from PSEG, Rate Counsel, NJLEUC, P3, and the IMM. The Board received reply briefs from PSEG, Rate Counsel, and the IMM. We summarize their positions below.

##### **PSEG Brief**

PSEG argues that the Hope Creek, Salem 1, and Salem 2 applications fully satisfy the eligibility criteria set by the Legislature and, as such, the Board should extend the current ZEC charge of \$10/MWh for the second eligibility period. PSEGb at 31. PSEG argues that Salem 1, Salem 2, and Hope Creek each satisfy the ZEC statutory criteria stressing that the plants are not projected to fully cover their costs and risks, including operational and market risk. Furthermore, PSEG argues that it is undisputed that it has satisfied the environmental criteria of the ZEC Act. PSEG’s remaining arguments specifically refute arguments from opponents regarding the nuclear plants’ costs and risks advanced by other parties.

First, PSEG claims it satisfies the financial need criteria under the ZEC Act. PSEG explains that Hope Creek, Salem 1, and Salem 2 are “projected to not fully cover its costs and risks.”<sup>20</sup> In support thereof, PSEG explains that the projected revenue for a nuclear power plant “is comprised of three elements: energy revenue, capacity revenue, and ancillary services revenue.” PSEGb at 5. Energy revenues were calculated for each plant as the product of the expected PJM locational marginal price at the plant’s location.<sup>21</sup> PSEGb at 5. The expected capacity revenue for each unit is “the product of the quantity of unforced capacity the unit is eligible to sell into the PJM capacity auction, and the forecasted auction price.” PSEGb at 6. The plants’ expected revenue from reactive power voltage ancillary services was based on tariff rates. PSEGb at 6.

The costs set forth in PSEG’s application included operation and maintenance (“O&M”) expenses including labor costs; support services, and allocated overhead, outside services costs. PSEGb at 6. PSEG explains that its costs also include fuel expenses, spent fuel costs, non-fuel capital expenditures associated with long-lived plant equipment required to maintain safe and reliable operations, and the cost of working capital. PSEGb at 6.

The risks for each plant fell into two categories: operational risks, and market risks. PSEG noted that it is impossible to predict the precise costs due to operational risk, but used a 10% adder to estimate foreseeable future costs which, according to PSEG, is consistent with the method used by PJM to determine a facility’s cost for energy and capacity bids. PSEGb at 7. Regarding market risks, PSEG explained that it is exposed to risk in both the energy and capacity markets. PSEG calculated the market risks in the energy market and capacity market, modeling a number of scenarios, which were detailed in its application.

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<sup>20</sup> PSEG explained that, “[t]he ZEC Act provides an applicant with two potential approaches to demonstrate financial need, only one of which must be used. The potential approaches are: (1) demonstrating a plant is ‘projected to not fully cover its costs and risks,’ or (2) demonstrating a plant is ‘projected to not cover its costs including its risk-adjusted cost of capital.’” PSEGb at 5 (citing N.J.S.A. 48:3-87.5(e)(3)).

<sup>21</sup> PSEG stated its belief that the date of its application was a reasonable point in time to measure forward energy prices for purposes of this case. PSEGb at 6.



Based on the costs submitted with its application and its calculation of operational and market risk, PSEG concluded that none of the plants' revenues would be sufficient to cover its associated costs and risks. The payment required for each plant, PSEG argued, was in excess of the requested \$10/MWh over the three-year eligibility period.

Regarding environmental impact, PSEG explains that the Legislature in enacting the ZEC Act acknowledged New Jersey's historical reliance upon a diverse mix of energy sources, including nuclear power, and the retirement of Hope Creek, Salem 1, and Salem 2 would result in an increased reliance upon gas-fired generation imported from other states.<sup>22</sup> PSEGB at 11. Additionally, "the negative public health impacts caused by the increase in pollutants that would result from closure of the plants would fall most heavily on minority and low income populations within the state." PSEGB at 9. PSEG supported its application with studies conducted by PA Consulting and ERM Consulting, which demonstrated that retirement of any one of the nuclear plants would result in significant increases in greenhouse gas emissions and ozone levels.

PSEG argues that it has three areas of disagreement with Levitan: a) projected capacity revenues; b) how to evaluate the facilities' financial risk; and c) spent fuel costs. PSEGB at 12-22. PSEG argues that Levitan's projections rely on historic data, and ignore recent changes to auction parameters, which will push capacity prices downward. Next, PSEG argues that Levitan improperly excludes operational and market risks in its analysis. Finally, PSEG takes issue with Levitan refusing to consider spent fuel costs, arguing that this refusal ignores the plain language of the ZEC Act.

Finally, PSEG argues that the other parties' views of PSEG's finances are erroneous. PSEGB at 21-31. For example, PSEG claims that the IMM, similar to Levitan, applied the three-year historical average of EMAAC<sup>23</sup> BRA<sup>24</sup> prices, which is inappropriate because known changes to the marketplace will likely result in lower prices. PSEGB at 23. Additionally, on cross examination during the proceedings, "Rate Counsel's expert admitted that he did not provide a capacity price forecast and that the historical prices from the BGS auction did not incorporate known changes in the marketplace." PSEGB at 23. In contrast, PSEG explains that its methodology incorporates changes to the BRA and other known variables. PSEGB at 24. As for energy revenues, PSEG claims that the IMM asserted that market rule changes regarding reserve pricing and fast start pricing have the potential to raise energy market prices. PSEGB at 24. However, PSEG asserts that these are changes known to the market, and "it is reasonable to assume they ~~would~~ be reflected in forward prices" used in modeling energy revenues. PSEGB at 24.

PSEG also claims that the IMM's cost calculations incorrectly relied on data gathered by the Electric Utility Cost Group ("EUCG") and published in an annual report by the Nuclear Energy Institute ("NEI") to "adjust" the cost data submitted by PSEG in this case. PSEGB at 24. PSEG claims that the IMM's approach is deeply flawed as it removes fully allocated overhead costs from the analysis, in contravention of the text of the ZEC Act. PSEGB at 24-25.

PSEG also argues that the IMM and Rate Counsel are incorrect about nuclear risk. PSEGB at 26. PSEG explained that nuclear plants are exposed to operational risk, and to more operational risk than other resource types. Additionally, as previously described, PSEG claims that the method used in the applications for determining operational risk is reasonable and consistent with industry

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<sup>22</sup> PSEG noted that, "[t]he IMM's testimony on fuel diversity addresses the question across the entire PJM footprint, and thus ignores the Legislature's concern with the 'factors affecting the deliverability of natural gas to electric power generating stations in and around the State.'" PSEGB at p.12 (emphasis added)

<sup>23</sup> EMAAC refers to the Eastern Mid Atlantic Area Council, which is a region within PJM consisting of New Jersey, Delaware, and parts of Maryland.

<sup>24</sup> BRA refers to the Base Residual Auction conducted by PJM.

practices. PSEGB at 26-27. Furthermore, PSEG explains that empirical evidence shows that the methods used in the applications is actually conservative and that the 10% adder is “actually is a low-end estimate of operational risk.” PSEGB at 27. PSEG further asserts that, contrary to the IMM’s argument, operational risks are not merely a theoretical possibility, and that in fact PSEG has provided examples of unexpected regulatory mandates and equipment failures that have resulted in unanticipated costs in the past. PSEGB at 28.

PSEG explains that, “[t]he IMM and Rate Counsel’s novel position flies in the face of the statute that the Board is obligated to enforce in this case and an interpretation of that statute that the Appellate Division has already affirmed.” PSEGB at 30.<sup>25</sup> PSEG states that, “the plain meaning of the word ‘risk’ is potential exposure to a negative event, and the concept of an “upside risk” is nonsensical.” PSEGB at 30. PSEG argues that the ZEC Act specifically refers to the “cost of operational risks and market risks,” and the only operational risks identified are “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 a *lower than expected capacity factor*.” PSEGB at 30 (quoting N.J.S.A. 48:3-87.5(a)). PSEG also claims that “ignoring risk would be tantamount to a finding that a nuclear plant should be willing to operate indefinitely without any expectation of a reasonable return.” PSEGB at 30.

PSEG concludes that the three nuclear generating stations satisfy the eligibility criteria to be awarded ZECs in the amount of \$10/MWh during this second ZEC eligibility period.

### **IMM Brief**

Monitoring Analytics, LLC, in its capacity as the IMM, submitted a brief focused only on what it characterized as “the most significant” of the ZEC Act criteria, the financial criterion. IMMb at 1-2. The IMM contends that no ZEC is warranted based on its view that the applicants failed to meet the financial criteria of the ZEC Act.

The IMM states that applicants did not submit analysis or evidence concerning the concept of risk adjusted cost of capital. IMMb at 4. According to the IMM, the applicants’ failure to demonstrate that any of the Units satisfy the financial criterion is sufficient basis for denial even without considering the evidence presented in the Market Monitor Report, which according to the Report affirmatively shows that the plants’ asserted benefits are not at risk of loss because they are projected to fully cover their costs and risks over the next three years. IMMb at 4-5.

With respect to underestimating revenues in their analyses, the IMM states that applicants’ projected revenues understate revenues in contrast to results if expected energy revenues are calculated using historical average generation, adjusted for refueling outages, and forward prices as of January 4, 2021. Using the IMM approach to evaluate Hope Creek, Salem 1 and Salem 2 would show applicants earning substantially more in energy revenue than PSEG’s projections over the three- year period energy years 2022/2023-2024/2025. IMMb at 5. The IMM asserts that applicants’ projected energy market revenues also do not include substantial revenue increases likely to occur as a result of PJM’s implementation of new reserve pricing and fast start pricing rules. For capacity revenues, the IMM states that a calculation using historical average EMAAC Base Residual Auction (“BRA”) prices would yield substantially more revenues for Hope Creek, Salem 1 and Salem 2 for energy years 2022/2023 through 2024/2025. IMMb at 5.

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<sup>25</sup> See also In re Implementation of L. 2018, C. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, \_\_\_ N.J. Super. \_\_\_, 2021 WL 1045495 (App. Div. 2021) (hereinafter “ZEC I Affirmance”).

Turning to costs, the IMM's analysis of Unit costs is based on applicants' avoidable costs as submitted by applicants to the Electric Utility Cost Group ("EUCG") Nuclear Committee, a cooperating group of nuclear plant representatives whose primary goal is to optimize costs and reliability performance of participating plants. IMMb at 6. Applicants submitted lower cost data to the EUCG than provided to the Board in the ZEC applications, leading the IMM to make appropriate adjustments in the Market Monitor Report. The IMM points out that the applicants provide no explanation for using costs in its applications that are higher than those it provided to EUCG and argues that the Board can be confident that cost information provided by applicants to EUCG is more accurate and appropriate for the ZEC review. IMMb at 6.

The IMM analyzed the applicants' proposed approach to quantifying risk including what the IMM viewed to be unsupported operational risk and market risk adders to expected costs. The IMM argues that applicants' operational risk adder is not based on analysis, rather is simply asserted. IMMb at 6. The IMM challenges applicants' approach of adding an arbitrary 10 % to actual operating costs to reflect the unknown possibility that costs may be higher by an unspecified amount, despite actual declines in costs in the first year of the first implementation period. The IMM states that the proposed operational risk adder "is an unsupported request to require customers to pay an additional subsidy to cover an asserted and unquantified possibility that costs will be greater than applicants' estimates while not providing customers any benefit if costs are lower and not recognizing the role of management in controlling costs and thus not providing incentives for management to continue to reduce costs." IMMb at 6-7.

The IMM argues that applicants' petition fails to explain why their asserted claim—without supporting data—is an appropriate measure of risk, and why they do not use common practices such as the mean expected revenues or a weighted average of the range of expected revenues. IMMb at 7. The IMM argues that applicants seek to have customers hold them harmless, through the guaranteed risk adder, from low probability negative events and even foreseeable costs that are within the applicants' control such as many operational costs outlined in their application, the IMM observes. IMMb at 7. The IMM rejects this as an inappropriate approach to risk as applicants request that ratepayers not only cover their costs, but that ratepayers should pay a significant additional markup over actual revenues to protect applicants from any possibility that costs are higher or revenues lower than applicants actually expect. IMMb at 8.

The IMM states that its own report demonstrates that the actual value for market risk, when using best practices for risk analysis and accounting for the full range of possible outcomes, is negative and not positive, meaning it is more likely that actual net revenues will be higher than expected. But to be conservative, the IMM set the market risk adder to zero in its analysis. The IMM Report shows no ZEC subsidies are justified. Even after explicitly accounting for risk, the IMM found that Hope Creek and Salem 2 are projected to more than cover their avoidable costs over the next three years while Salem 1 is expected to face a *de minimis* shortfall over the next 3 years that does not justify a subsidy. The IMM also argues that the overpayment of ZECs subsidy revenues for 2019/2020 more than covers that shortfall for Salem 1. IMMb at 8-9.

Finally, the IMM urges the Board to consider that reliance on applicants' subjective statements of intent to shut down the plants is speculative, applicants have not demonstrated an objective basis for shutting the Units down, and speculative and unsubstantiated statements should not be accepted as a grounds for meeting the requirements of the ZEC Act. IMMb at 10-11.

## **Rate Counsel Brief**

Rate Counsel argues that the applicants have failed to meet their burden of demonstrating that their nuclear units meet the statutory criteria and therefore no ZECs should be awarded, but concedes if the Board does find that some ZEC subsidy has been justified, the statute permits the award of less than \$10/MWh. Rate Counsel also questions whether ZECs should be awarded if the award of ZECs does not guarantee continued operation of the plants. RCb at 1. Rate Counsel argues that, in order to award ZECs, the Board must find that all the statutory ZEC criteria are met, and that an award of ZECs would result in just and reasonable rates. Rate Counsel further argues that the applicants have not met the financial criteria to support an award of ZECs, and that the applicants have overstated their future costs, while understating their future revenues. Next, Rate Counsel argues that ZECs are not required to maintain reliability, and that the applicants' claimed environmental benefits are overstated. Finally, Rate Counsel argues that, if the Board does award ZECs, it should award a reduced ZEC amount.

Rate Counsel begins by arguing that the Board must find that the applicants satisfy all five statutory criteria found at N.J.S.A. 48:3-87.5(e) prior to awarding ZECs. RCb at 16. Rate Counsel stresses that it is important to note that the statutory criteria do not include "reliability" as a factor for eligibility and that none of the five ZEC Act criteria directs the Board to determine the plant's impact on reliability or assuring that there is adequate generating capacity to "keep the lights on," which Rate Counsel argues is the sole responsibility of PJM as discussed in evidentiary hearings. RCb at 18; T80:L7-23; T82:5-17; T214:L23 to T215:L6. Similarly, Rate Counsel argues that the ZEC Act makes no provision for the Board to balance the interests of ratepayers against those of the applicants as is done in matters involving public utilities due to the Board's statutory responsibilities to consider the financial health of the entities providing regulated service because the applicants are not public utilities. See N.J.S.A. 48:3-16, 48:3-7, & 48:3-9. RCb at 17-18. Rate Counsel argues that nothing in the ZEC statute relieves the Board of its obligation to ensure that the rates that it sets are just and reasonable. RCb at 18.

Rate Counsel next argues that the applicants have not shown that they meet the financial criteria for an award of ZECs. Rate Counsel referenced the prefiled testimony of its witness Andrea Crane, who analyzed confidential information related to the applicants' claimed shortfalls including significant costs related to operational and market risk. Although the amounts being claimed by applicants as "cost of risk" are substantial, according to Rate Counsel, none of the claimed operational and markets risks represent costs actually incurred by the applicants but, instead, they are cost "cushions" to protect the nuclear operators in the event costs are higher or revenues are lower than forecast. RCb at 23. Rate Counsel highlighted a statement in evidentiary hearings by PSEG witness Daniel Cregg who acknowledged that, with only limited exceptions such as if the plants receive payments for fuel diversity or environmental attributes, the ZEC Act does not provide a mechanism for ratepayers to share in higher-than-expected profits. T18:L4 to T19:L19. Rate Counsel views this result as a one-sided and unfair allocation of risks under which ratepayers would guarantee against the risks of ownership, but would be entitled to none of the rewards. RCb at 23.

Rate Counsel notes that both the IMM and the Board's consultant, Levitan, agree with Rate Counsel that ratepayers should not be required to subsidize the applicants' claimed costs of risk with the IMM's Report explaining that the applicants have "incorrectly define[d] risk," which should reflect the probability of both positive and negative outcomes. Rate Counsel also points to the IMM agreeing with Ms. Crane that the proposed operation risk adder is not a cost at all, but rather a request for a subsidy to "cover an asserted and unquantified possibility that costs will be greater than PSEG's estimates while not providing customers any benefit if costs are lower." IMM-1, p. 24. RCb at 23-24.

Rate Counsel also challenged applicants' claimed cost of market risk. RCb at 24. Rate Counsel states that applicants' risks relating to capacity revenues appear to be minimal despite the claim that capacity revenues are at risk due to the PJM Minimum Offer Price Rule ("MOPR") and the risk of not clearing the capacity auctions is the most significant component of capacity market risk given that PJM has not yet conducted BRAs for capacity resources for ZEC 2 energy years. RCb at 25. Rate Counsel explained that the MOPR was intended to prevent capacity resources that receive state subsidies from using those subsidies to submit lower bids and suppress prices for resources that do not receive subsidies. T15:L25 to T16:L9. The MOPR sets floor prices for subsidized resources such as those receiving ZECs so that the resource is not allowed to offer into the capacity auction at any price below the floor price. PS-1, p. 19; RC-3, p. 23; T16:L15-20. The floor price will prevent the unit from clearing the auction if the floor price is higher than the market clearing prices, but if the floor price is below the market clearing price, a unit bid at the floor price will clear the auction. Even assuming the units receive ZECs, it appears that the risk of not clearing is minimal, according to Rate Counsel, referring to Mr. Cregg's testimony in the evidentiary hearing on three auctions to be held for ZEC 2 energy years, wherein he explained PSEG performed an analysis and expects the market clearing price to be above the floor prices for all three units in the first energy year so they will clear the next BRA auction. RC-3, p. 24-25; T17:L1-13. According to Cregg, PSEG's asserted cost of market risk does not include risk related to the next BRA auction. T35:L24 to T36:L19. Rate Counsel points out that PSEG asserts that there is a greater capacity market risk for the following two BRAs, but Rate Counsel suggests that after reviewing PSEG estimated floor prices for the Hope Creek, Salem 1 and Salem 2 units and confidential data, it appears that the cost of capacity market risk is minimal and does not support the cost of risk included by the applicants in their filing. RCb at 26-27.

PSEG and Exelon have included capital expenditures as part of their projected cost on a cash-flow basis representing a significant portion of claimed shortfalls and Rate Counsel witness Crane explained that this approach provides for immediate recovery of capital investment—allowing PSEG and Exelon to be fully compensated for their entire capital investments on an annual basis “contrary to both common practice and basic accounting principles.” RC-1, p. 19-20. RCb at 28. Rate Counsel argues that recovery of 100 % of capital costs in the year they are incurred “violates a basic accounting principle that costs that provide a benefit over multiple years should be recovered over a multi-year period.” RC-1, p. 21. Further, Rate Counsel points out that deregulated businesses have no expectation that capital expenditures will be recovered on a “cash flow” basis, and this is especially true of major investments that are expected to remain in service for many years, as well-developed accounting rules establish. RC-1, p. 21-22. This “cash flow” recovery of capital investments creates intergenerational inequities, Rate Counsel maintains, as it requires current ratepayers to pay for investments that will provide benefits for many years, and applicants could sell the units for a profit that would be retained by shareholders. RC-1, p. 22. RCb at 29. Finally, Rate Counsel argues that the ZEC three-year review period is inconsistent with capital budgets that are intended to provide benefits for many years over the remaining lives of the units and, therefore, the Board should consider whether ratepayer-funded subsidies should be limited to investments that are necessary to keep the units in operation through the end of the second eligibility period. RCb at 30.

Rate Counsel next argues against the inclusion of millions of dollars in spent nuclear fuel disposal costs that are not actually being incurred as the spent fuel disposal charge has been suspended by court order since May 2014. Rate Counsel notes that both the IMM and Levitan are in agreement with Rate Counsel that ratepayers should not be required to subsidize these nonexistent charges and that PSEG acknowledges that the suspended spent fuel disposal fee is not recorded as a liability on its publicly filed financial statements because “the fee has not met the accounting thresholds as prescribed by Generally Accepted Accounting Principles (“GAAP”) to be recorded as a liability.” RCb at 31.

The last cost item Rate Counsel challenges is the claims for support services and overhead costs because applicants have not demonstrated that support services and overhead costs included in their subsidy claim are reasonable. Rate Counsel witness Crane explained these are costs based on allocations of likely fixed cost that are incurred by PSEG's Service Company which are unlikely to be avoided under a shut down, but would only be reduced. RCb at 32-33.

Rate Counsel argues that applicants' projected energy revenues are based on an unreasonable assumption of low forward energy prices and that through the proceeding, the applicants have sought to cherry-pick instances of low energy prices for purposes of assuming future energy revenues. Rate Counsel's witness Chang testified that forward energy prices continue to fluctuate but are currently trending upward. See T166:L10-12; RC-3, Page 14, Lines 7-11. Rate Counsel recommends that the Board should therefore rely on an average of the historic energy prices rather than picking a price on a specific date for purposes of calculating future energy market revenues, a position that correlates with the findings of Levitan and the IMM. Rate Counsel referred to the IMM's January 29, 2021 report noting that recent changes by PJM to the energy market, *i.e.* PJM's approach to reserve pricing and fast start pricing, will likely increase prices in the future. As provided in Mr. Chang's testimony, the applicants' energy revenue projections are highly dependent on the assumptions regarding future energy prices, Rate Counsel states, so that changing the assumptions of energy price forwards can result in millions of dollars of additional projected revenues for the applicants. RCb at 33-34.

Rate Counsel states that based on the analysis by Mr. Chang, Levitan, and the IMM, the Board should reject the applicants projected energy revenues because they are not based on reasonable assumptions of future energy revenues during the eligibility period, and applicants' analysis does not consider PJM's changes to the energy market or an average upward trend in prices when compared with 2016 to 2019, indicating that the projected future revenues for nuclear units will be higher during the second eligibility period than those proffered by the applicants. RCb at 36.

Rate Counsel asserts that the applicants' capacity revenues are understated. Rate Counsel challenges the confidential assumed forward capacity price in the applications as it does not match a reasonable assumption of forward capacity prices, or the Board's own assumptions. RCb at 36. Rate Counsel notes that Levitan and the IMM employ a forward capacity price that is higher than the forward capacity price projected by the applicants. RCb at 37.

Rate Counsel also determined that applicants excluded hedging revenues because they are not tied to specific generating units, however the nuclear units clearly provide an energy source that is integral to the company's hedging positions as a January 2021 representation to investors stated that it hedges energy prices for its nuclear units. PSEG January 2021 Investor Update, Panel 27. Rate Counsel also points out that at the same time PSEG has excluded hedging revenues, it has implicitly included the cost of hedging activities in its market risk models and concludes that it is unfair to exclude hedging revenues while seeking to charge ratepayers for the associated costs of hedging. RC-1, p. 28. RCb at 38.

Rate Counsel states that applicants generally ignored tax benefits in their financial analyses including the significant tax benefits resulting from ownership of an unregulated entity under of the Tax Cuts and Jobs Act of 2017 ("TCJA"), which reduced the corporate federal income tax rate from 35 % to 21 % and resulted in millions of dollars of excess deferred taxes relating to the nuclear units. RC-1, p. 29; RCb at 38-39. For regulated utilities, Rate Counsel reminds, the Board directed companies to file to return excess deferred income taxes to ratepayers. RCb at 39. However, unregulated entities can immediately reflect the impact in their income statements. In contrast to New Jersey utilities, Rate Counsel argues, following the enactment of the TCJA both PSEG and Exelon recorded credits

to income, thus providing shareholders with benefits that would have been refunded to ratepayers if these companies had been regulated utilities. RC-1, p. 30. RCb at 39-40.

Rate Counsel next argues that reliability is not an element under the ZEC act, and reliability concerns should not drive the Board's decision on whether to grant a subsidy. RCb at 41-42. Rate Counsel noted discussions related to reliability during the evidentiary hearing, and characterizes this concern as a red herring. RCb at 42. Rate Counsel notes that the system is not so fragile that it relies on unregulated generation owners to maintain system reliability when PJM, as the Independent System Operator, conducts load forecasts and maintains a reserve margin so that there is a cushion of generation in the event some plants are unable to provide capacity when needed. If a plant seeks to close down, Rate Counsel explains, PJM will conduct a review to determine whether continued operation of that plant is needed for reliability purposes and will compensate its operator under a "Reliability Must Run" contract if necessary, but PJM is able to ensure that the decision of a private unregulated corporation to close its facility cannot unilaterally undermine reliability in any state within PJM's jurisdiction. RCb at 42-43. Moreover, Rate Counsel argues that if reliability were a relevant factor, it would not support an award of ZECs.

Rate Counsel referred to the evidentiary hearing testimony when PSEG witness Cregg was asked directly by Commissioner Chivukula whether "there [is] an assurance" that the company would not close the plants with a \$10 ZEC, and Mr. Cregg responded that there was a "self-correcting element" that would incentivize continued operation. T27:L1-16. Rate Counsel notes that the "self-correcting element" referred to by Mr. Cregg provides a broad range of scenarios under which the applicants could choose to close down the plants without repayment of the ZECs. See N.J.S.A. 48:3-87.5(k)(1).

The numerous exceptions that would exempt applicants from repaying ZECs include what Rate Counsel notes are common occurrences for most New Jersey residents, such as an increase in property or other taxes and Rate Counsel expects that applicants will likewise be excused from returning any money to ratepayers following any change in state or federal law which reduces the value of the ZEC. RCb at 44-45. Rate Counsel enumerates several initiatives currently under consideration at the BPU, FERC and PJM that could result in the PSEG collecting the ZECs, closing the plants and keeping the money with no recourse for ratepayers. Rate Counsel argues there is no assurance in the statute that the applicants will stay open or that ratepayers will get refunds of amounts paid if they close. RCb at 44-45.

Rate Counsel next argued that the applicants overstate the claimed environmental benefits. Rate Counsel experts reviewed applicants' environmental emissions modeling performed by PA Consulting and ERM and noted that although the results of this modeling demonstrate that GHG emissions would increase under both shutdown scenarios done, the amounts would still keep New Jersey below the Global Warming Response Act 2020 targets. ("GWRA"). N.J.S.A. 26:2C-37. Although applicants stated that the retirement of the three units would impede the state's 2050 goals of 25.4 MMT in 2050, Rate Counsel argues that the state still has options to meet the 2050 GWRA limit with the scheduled retirement of the units and accelerated offshore wind development that was not fully modeled in the most recent Energy Master Plan. RC-3, page 27; RCb at 46-47.

Rate Counsel points to Mr. Chang's testimony which notes "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." RC-3, p. 27 lines 15-16; RCb at 48. Rate Counsel maintains that with the inclusion of the incremental 3,500 MW of offshore wind, the 7,500 MW of offshore wind will generate more energy than the three nuclear units even with the discrepancy of differing capacity factors for nuclear energy, 93.4%, and offshore wind, 60-64%, Chang testified that the potential to build out offshore wind projects to meet and to exceed the state's goals of 7,500 MW for offshore wind will eclipse the energy

generation capacity of the three New Jersey nuclear plants and Rate Counsel further argues that applicants' argument that the higher capacity output of the nuclear units cannot be replaced by the states achievement of its offshore wind goal due to the higher capacity of the nuclear units is therefore unfounded. Rate Counsel states that applicants have failed demonstrate that the "emissions avoidance benefits" of these plants justifies the approximately \$300 million per year cost of the ZECs. RCb at 49.

Finally, Rate Counsel argues that if the Board decides to award a ZEC, it should award a reduced ZEC charge. Rate Counsel explains that the ZEC Act presumes that the subsidy will be lower than the social cost of carbon for avoided New Jersey emissions, Rate Counsel states, referring to the Act's provision "[t]he 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 continued operation of selected nuclear power plants, ensuring that the program does not place an undue financial burden on retail distribution customers." RCb at 52 (quoting N.J.S.A. 48:3-87.3(b)(8)). Viewing the social cost of carbon value of avoided carbon emissions as the upper limit to any ZEC rate, Rate Counsel witness Chang provided a calculation for the social cost of carbon value of the avoided emissions using 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. For the social cost of carbon, Mr. Chang used 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 of \$42/metric ton in 2007dollars as referenced in the ZEC Act, Rate Counsel stated, and a more recent social cost of carbon reported in the 2020 "Social Cost of Carbon" report by the United States Government Accountability Office which has \$50 per metric ton in 2018 dollars and a 3 % discount rate. Chang's analysis resulted in a social cost of carbon value of \$46.51 per short ton (2020 dollars), which is very similar to the \$46.60/per short ton from the ZEC legislation. Rate Counsel recommended that if the Board determines that a ZEC subsidy is warranted, the Board should use Mr. Chang's social cost of carbon value of avoided emissions as the upper limit for ZEC payments for continued operation of the three nuclear units from 2022 to 2025. RCb at 52.

PSEG has not met its burden to receive a ZEC subsidy, Rate Counsel concludes, but if the Board nonetheless decides to allow a ZEC payment, it should not be the full \$10/MWh rate, but instead no higher than the social cost of carbon value of avoided emissions calculated by Mr. Chang. RCb at 55-56.

### **NJLEUC Brief**

In its brief, the NJLEUC argued that the ZEC Act did not supersede or limit EDECA and the Board's final restructuring order; that the Board should deny the subsidy or reduce it; and that it was denied due process by not having access to confidential materials.

NJLEUC begins its brief by detailing the history of the passage of the ZEC Act, during which opponents of the proposed nuclear subsidy voiced considerable concerns regarding the process by which the applications for subsidies would be considered. NJLEUCb at 2-3. They continue by explaining the history of the ZEC I administrative proceeding, during which it was denied full intervenor status. NJLEUCb at 3-4. NJLEUC points out that PSEG had authorized the closure of its three nuclear plants if they were not awarded ZECs, and contends that this threat led to the Board awarding ZECs to the three applicants in ZEC I. NJLEUCb at 4-5. NJLEUC contends that in ZEC II, the Board has the authority to lower the subsidy, and that it should not be deterred from lowering the subsidy by threats that PSEG might close its nuclear plants. NJLEUCb at 6-15.



NJLEUC first contends that the ZEC Act did not supersede or limit EDECA. NJLEUC argues that PSEG inflates its costs and risks. NJLEUCb at 16-17. They note that the experts from Rate Counsel, the Independent Market Monitor, and Levitan “make a compelling case that the costs and risks asserted by the companies under the ZEC Act have little, if any, merit.” NJLEUCb at 18. This testimony indicates, as it did in the ZEC I proceeding, that “certain of the costs included in the companies’ applications were padded or not ‘true’ costs that were actually incurred by the companies, but instead represented a metric relevant only for generation planning purposes.” NJLEUCb at 36.

Furthermore, NJLEUC argues that the restructuring of the electric industry absolved ratepayers of the responsibility for the costs and risks of deregulated nuclear generation facilities. NJLEUCb at 18. They argue that the Board’s Restructuring Order specifically relieves ratepayers of all the costs contemplated by the ZEC Act. According to NJLEUC, the ZEC Act is inconsistent with EDECA and the Board’s Final Restructuring Order because it imposes responsibility for costs and risks associated with deregulated power plants on ratepayers. NJLEUCb at 27. NJLEUC urges an interpretation of the ZEC act which would limit the amount of any subsidy to the value of the plants’ environmental attributes, and not reinstate ratepayer responsibility for costs and risks associated with deregulated nuclear plants.

NJLEUC next argues that the Board can and should reduce the amount of subsidy awarded to the nuclear plants. NJLEUC contends that PSEG’s CEO provided the amount of the requested subsidy to a primary sponsor of the ZEC Act. NJLEUCb at 31. This process, they argue, is contrary to the traditional ratemaking process. NJLEUC highlights statements regarding the Board’s inability to alter the amount of the subsidy in ZEC I, and contends that the Board has the power to reduce the amount of the subsidy in the ZEC II proceeding. NJLEUCb at 31-33. Based upon the publicly available information in this proceeding, NJLEUC argues the plants are either profitable or experiencing minimal, possibly short-term financial losses. Given these circumstances, NJLEUC recommends that the Board should deny the applications for subsidies or award a reduced subsidy tied to the plants’ financial performance and a fair valuation of their clean generation attributes. NJLEUCb at 39

NJLEUC lastly questions why they were denied access to the confidential information in this proceeding. NJLEUC argues that its significant financial and unique business interests in, an expertise regarding the subject matter of the Board’s contested proceedings have consistently been found to satisfy the New Jersey Administrative Code standard for intervention and to be eligible to obtain access to confidential information in prior proceedings. NJLEUCb at 40. The denial of access to confidential information, they argue, prohibited NJLEUC from meaningfully participating in this proceeding, even though their members have a potential multi-million-dollar exposure from this proceeding. NJLEUCb at 41. They argue this denial constitutes a denial of NJLEUCs due process rights. NJLEUCb at 41.

Rate Counsel’s participation in this proceeding did not preclude the intervention with full rights of other ratepayer representatives in the proceeding, NJLEUC contends. NJLEUCb at 43. Referencing its significant financial stake in the outcome of this proceeding, NJLEUC argues that it should have been permitted full access to confidential information as its access to same was essential to aid the board in making determinations required under the ZEC Act. NJLEUCb at 45.

### **P3 Brief**

P3 asserts that Hope Creek, Salem 1 and Salem 2 presently operate profitably without the need for ZEC subsidies. P3b at 1. It offers a reminder that the Board's only obligation is a ZEC subsidy application review, not a ZEC subsidy automatic payment. P3 further proffers the premise that the nuclear plants will not close, as threatened, if the Board does not "acquiesce... to a windfall for the company" by not granting the ZEC subsidy. P3b at 1. Further, the warnings of repercussions from these nuclear plant closures – reliability, added transmission costs, and emissions - are just distracting "numerous red herrings", because even if the plants did close, (1) "PJM has ample reserve margins to absorb the lost capacity" and maintain reliable generation; (2) consumers might avoid the \$266.5 million transmission cost of a PJM plan to deliver electricity to Delaware and Maryland; and (3) increased emission levels from replacement-units are not guaranteed. P3b at 2. Simply stated, P3 contends this is a case about a company that is "not content about its current profit margin on unregulated facilities and is seeking through the regulatory process to increase its take." P3b at 2. Accordingly, P3 argues the BPU should deny PSEG and Exelon's request for ZECs.

While P3 was not granted access to confidential information in these matters, it still listed a litany of arguments, derived from publicly available information and its reliance on the testimonies of other parties granted confidential access to support its conclusion that because PSEG: (1) overstated its costs and risks, (2) understated its revenues; and (3) submitted market and operational risks that were "speculative and inappropriate", it "failed to demonstrate its need for the ZECs." P3b at 8 and 5.

More specifically regarding costs, P3 quotes Rate Counsel expert Andrea Crane's findings of several cost overstatements, such as: (1) the "immediate recovery of the applicants' significant capital costs" in the year incurred, rather than the generally accepted accounting principle ("GAAP") of spreading capital cost recovery over the multi-year life of an asset. P3b at 7. This short-term cost realization relieves the "applicants from risks associated with incremental plant investment"; (2) the inflation of the variable portion of support service and overhead costs; (3) the ignoring of tax benefits; and (4) spent fuel costs not actually incurred since 2014 and mentioned in PSEG's financial statements only as an environmental - not financial - matter,<sup>26</sup> nor placed into a trust or other segregated fund." P3b 7-8.

Concerning the "speculative and inappropriate market and operational risks", P3 again quotes Rate Counsel by stating the applicants' risk-measuring methodologies inflate reported operating costs to such an extent that they make up a "very significant portion of the overall shortfalls being claimed", and "comprise almost the entire subsidy amount being requested." P3b at 8-9. Further, Rate Counsel states and P3 agrees that ratepayers should not be the guarantors of last resort "for all possible contingent risks related to operating revenues." P3b at 9. P3 also addresses the IMM's positions, noting that PSEG's cost-of-risk calculations, based solely on the worst possible outcome, ignores the "full (range) of possible outcomes", resulting in a one-way street where PSEG proposes that customers hold it harmless from the downside risks of operation, without similarly holding customers harmless from its upside cost-of-risk possibilities. P3b at 10.

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<sup>26</sup> See PSEG 2020 10-K at 20.

Regarding revenues, P3 noted its limited ability to critique PSEG's projected capacity assumptions because they lacked access to confidential information. P3b at 13. P3 relies instead on the IMM's January 29, 2021 analysis ("IMM's Analysis"), which shows, based on the "identified level of generation output and forward prices, energy market revenues and capacity market revenues, there is an increase in PSEG's forecast revenues for all units." P3b at 13. Similarly, P3 relies on Rate Counsel's expert, Maximilian Chang's, testimony which found projected revenues were understated for Hope Creek, Salem 1 and Salem 2 based on the applicants' proposed methodologies, which were at odds with Chang's findings that "PSEG revenue projections for the next five years show improved prospects relative to recent history." P3b at 13-14.

Finally, P3 argues that the Board should deny the request for ZECs raising three primary arguments. First, P3 argues that the units are profitable, and agrees with Rate Counsel that "...the applicants have not demonstrated that their financial condition warrants an additional award of ZECs." P3b at 15. P3 further notes the IMM's Analysis similarly concludes that Hope Creek and Salem 2 are expected to "more than cover their avoidable costs over the next three years", and that "no unit meets the standard for subsidy under the ZECs program." P3b at 15-16. Second, P3 argues that PSEG would ask for a greater subsidy if it were allowed, and that providing ZECs does not guarantee that PSEG will continue operating the plants. P3b at 16-17. Third, P3 argues that a different plant owner could likely provide the benefits of nuclear generation without a subsidy from the state. P3b at 18. P3 points to recent cases of nuclear generation facilities changing ownership within PJM (specifically Ohio and Pennsylvania), where the new owners are able to operate the plants profitably, and without state subsidies. P3b at 19-21.

P3 concludes by asking the Board to deny the applications for ZECs "and force PSEG to either live within its means or find someone else who can run these plants with an acceptable level of profit for that company and without a subsidy from the homes and businesses of New Jersey." P3b at 22.

### **PSEG Reply Brief**

In PSEG's Post Hearing Reply Brief, PSEG argues that the applications for the Hope Creek, Salem 1 and Salem 2 Plants should be granted because they fully satisfy the eligibility criteria, and are entitled to the full amount of \$10/MWh during this ZEC eligibility period. PSEGrb at 24-25.

First, PSEG argues that the Board must follow the policy and language of the ZEC Act which provides that the Board may only reduce the ZEC charge if the reduced charge will prevent retirement. PSEGrb at 3-4. PSEG noted that this was reiterated by the Appellate Division in the ZEC I decision: "The purpose of the ZEC Act is to subsidize nuclear power plants at risk of closure, helping them to remain operational despite competition from other carbon-emitting power sources in the interest of New Jersey's clean energy goals." PSEGrb at 4 (quoting ZEC I Affirmance, slip op. at 4). PSEG argues that Rate Counsel and NJLEUC incorrectly assert that the Board must ensure that the ZEC rate is "just and reasonable" in accordance with N.J.S.A. 48:2-21(b). PSEGrb at 4. However, the Appellate Division found, and Rate Counsel acknowledges, that N.J.S.A. 48:2-21(b) applies to rate cases initiated by the Board's Motion or a complaint which is different from the case here which "concerns applications submitted by three non-utility entities pursuant to a separate statute, N.J.S.A. 48:3-87.3 et seq. (the ZEC Act)." PSEGrb at 5. Additionally, PSEG explains that Rate Counsel's argument that the ZEC charge should be capped at \$5.12/MWh is contrary to the plain language of the ZEC Act. PSEGrb at 6. Specifically, PSEG

states that the ZEC Act does not provide that the amount of the ZEC charge should be capped at the value of avoided emissions and/or the value of avoided in-state emissions. PSEGrb at 7.

PSEG also argues that Chang's calculation incorporates less than 30% of the emissions and that "approach is contrary to both common sense and the plain language of the ZEC Act, in which the Legislature recognized that it was a 'moral imperative' to invest in infrastructure that reduced greenhouse gases *inside and outside* the state in order to prevent the irreversible impacts of global climate change." PSEGrb at 7. Additionally, PSEG points out that both Chang and PA Consulting determined that carbon emissions would rise both in New Jersey and in other PJM states if the Hope Creek and Salem plants were to cease operations. PSEGrb at 8.

PSEG also claims that Rate Counsel and others incorrectly argue that the Board must consider past regulatory action in which the BPU ordered the recovery of the "stranded costs." PSEGrb at 8. PSEG points out that Rate Counsel made these exact arguments before the Appellate Division in the ZEC I case, and those arguments were rejected. PSEGrb at 9.

PSEG additionally argues that it demonstrated financial need under the ZEC Act, and that Rate Counsel and the IMM's positions on financial need were rejected by the Appellate Division. PSEGrb at 10. Specifically, PSEG explains that "the Appellate Division decisively rejected Rate Counsel's and the IMM's cramped reading of the statute, which would exclude the cost of risk as well certain other categories of cost that the statute directs the Board to include in the analysis." PSEGrb at 10. The Appellate Division also affirmed the Board's financial needs analysis, and rejected Rate Counsel's challenge to the cash flow approach utilized by PSEG. PSEGrb at 11. PSEG explains that financial need is established by demonstrating that the units' forecasted revenues are not sufficient to cover their costs and operational and market risks, and historic risks and income taxes are not considered in either estimating the revenues or costs. PSEGrb at 11. Additionally, P3 argues that because Energy Harbor has decided to keep two plants in operation without a subsidy, and because Talen Energy managed to cut costs at one of its plants, it follows that Salem and Hope Creek must be "profitable and capable of being a going concern without the extra payment from consumers." PSEGrb at 12. However, PSEG notes that there is no evidence concerning the finances of nuclear plants in Ohio or Pennsylvania. Instead, "the record shows that of the 22 merchant nuclear plants in the Midwest and Northeast other than Hope Creek and Salem, seven have either retired since 2018 or are scheduled to retire; and another four (in Illinois and New York) would have retired without ZECs." PSEGrb at 12. PSEG also noted that P3's members, which are competitors in the PJM market, are better off if the nuclear plants do in fact retire. PSEGrb at 13.

Second, PSEG argues that its statements regarding its intention to retire the three plants are relevant under the ZEC Act. PSEG stated that the IMM, Rate Counsel, and P3 are accusing PSEG of coercing the Board into awarding ZECs by stating its intention to retire the plants in the absence of a material financial change. PSEGrb at 13. The ZEC Act *requires* PSEG to provide this certification, and if not, its application would be deemed incomplete. PSEGrb at 13-14. Additionally, PSEG claims that the record shows that it exercised its business judgement regarding whether to retire the plants in a reasonable manner. PSEGrb at 14. PSEG's SEC disclosures indicate that it will cease operations of the plants if the amount of the ZEC charge differs from that of the current period. PSEGrb at 14. PSEG also states, contrary to NJLEUC's assertions, PSEG is not seeking a "rubber stamp," but rather, its "applications are supported by a voluminous record, and the Board has directed significant time and resources towards probing PSEG's submittals, including hiring an independent consultant, and holding public and evidentiary hearings to help create a very comprehensive record." PSEGrb at 15.

Third, PSEG argues that the opposing parties' criticisms of PSEG's capacity and energy price projections, risk evaluation, and incorporation of hedging benefits are incorrect. PSEGrb at 15.

With regard to capacity price projections, PSEG provides that Rate Counsel, Levitan, the IMM, and P3 contend that PSEG's capacity price projections are too low. PSEGrb at 15. However, their central claim is that the projected capacity prices should be simply averages of historical capacity prices instead of projections. PSEGrb at 15. Additionally, PSEG claims that Rate Counsel also argues that PSEG inconsistently used historical capacity price projections in its comments regarding resource adequacy alternatives. PSEGrb at 18. However, PSEG argues that it would have been inappropriate for PSEG to use its proprietary capacity price forecast in a publicly filed document available to its competitors, and that the historical price projections were used for the purpose of showing the potential "double payment" impacts of the MOPR on New Jersey and capacity markets. PSEGrb at 18.

With regard to energy price projections, PSEG asserts that Rate Counsel erroneously accuses PSEG of seeking to "cherry-pick instances of low energy prices" and "ignor[ing] upward changes." PSEGrb at 18. PSEG claims this is incorrect because it "initially submitted its application with forward energy price data from May 2020 and then, in response to Staff-PS-0009 and Staff-PS-0011, updated the forward energy price data to reflect prices as of September 30, 2020, around the time when it filed its application—the same date Levitan used in its analysis." PSEGrb at 18-19.

PSEG also argues that Rate Counsel fails to support its claim that the MOPR creates "minimal" risk that the New Jersey nuclear units will fail to clear for the 2023/2024 and 2024/2025 delivery years. PSEGrb at 19. PSEG explains that Rate Counsel is incorrect in its assertion that, because PSEG has projected stable capacity prices for the three-year eligibility period, it should be assumed that the MOPR floor prices for the nuclear plants will also remain stable. PSEGrb at 19. However, PSEG argues that, "since there is a potential for changes in energy price projections, the Board should reject Rate Counsel's glib assumption that MOPR floor prices will remain stable throughout the eligibility period." PSEGrb at 20.

PSEG's notes that its estimates for the costs of risks are reasonable and well-supported in the record. PSEG notes that claims made by Rate Counsel, the IMM or P3 that some other company might be willing to accept a higher level of risks, or zero or negative expected returns, and still operate the plants are "immaterial." As stated by PSEG, it "has the sole responsibility and authority for making this decision." PSEGrb at 21.

Additionally, PSEG argues that the impact of hedging is included in PSEGs' financial analysis. PSEGrb at 21. PSEG claims that, "PSEG's risk model includes the price exposure experienced by PSEG Power for the period of time prior to [an] anticipated hedge, but reflects the risk mitigation of the hedge from that point onward through delivery." PSEGrb at 21.

Fourth and finally, PSEG argues that Rate Counsel ignores the substantial reliability benefits attributable to preservation of the three plants. PSEGrb at 22. PSEG notes that Rate Counsel argues that the reliability of the electric system should not even be considered by the Board in reviewing the ZEC applications. PSEGrb at 22. However, PSEG states that the "ZEC Act is concerned with electric system resiliency during times of system stress." PSEGrb at 23. Additionally, PSEG claims that Rate Counsel is mistaken about the role that "Reliability Must Run" arrangements would play in maintaining reliability. PSEGrb at 23. Instead, and contrary to the claim in Rate Counsel's brief, PSEG explained that PJM lacks the power to require a unit to continue operating even if a reliability need is identified, and instead, all PJM can do is offer an RMR arrangement and hope that the generator takes it. PSEGrb at 24.

**Rate Counsel Reply Brief**

In its reply brief, Rate Counsel reiterated its argument that PSEG overstates its projected costs, including the costs of operational and market risks, and understates its projected earnings and that PSEG continues to rely on phantom costs that either do not exist or are not paid out as part of its operating expenses. Rate Counsel further argues that PSEG's use of the Eastern Interconnection to calculate the social cost of carbon value of avoided emissions inflates the value of the nuclear plants. Finally, Rate Counsel seeks to refute the applicants' arguments regarding operational risk and reliability.

Rate Counsel argues that the record does not demonstrate that the applicants have met the financial criteria for an award of ZECs. RCrb at 3. They contend both Rate Counsel and Levitan have presented evidence that raises substantial questions as to the reliability and accuracy of the financial projection submitted by the applicants to justify their request for ZECs. While PSEG insists that the Board must accept PSEG's projections and reject the evidence that those projections are understated, and takes the even more extreme position that the ZEC Act mandates the Board's acceptance of cost projections that include speculative and one-sided estimates of risk, "cash flow" recovery of capital costs, spent fuel disposal fees that are not actually being incurred, and service company and overhead costs that have not been shown to be avoidable, Rate Counsel urges the Board to reject these arguments. RCrb at 3-4.

Rate Counsel states that the first time the Board reviewed the financial prospects of the Salem 1, Salem 2 and Hope Creek as under the Board's 1999 Order on PSEG's rate unbundling, stranded costs and restructuring filings, the Board committed PSEG's ratepayers to pay \$2.9 billion in irrevocable stranded cost payments over fifteen years based in large part on PSEG's valuation of the three nuclear units and PSEG's valuation then proved to be "substantially off the mark," and ratepayers were compelled to pay substantial subsidies to an unregulated entity that needed none. Rate Counsel asserts that this history alone is ample reason for the Board to take a skeptical view of PSEG's financial projections in this proceeding. RCrb at 4.

When projecting revenues from sales into the PJM energy and capacity markets, Rate Counsel recommended that the Board rely on an average of historic energy prices, rather than allowing the applicants to "cherry pick" the low energy prices that prevailed on May 29, 2020 and dismisses PSEG's briefed position that "[b]ecause forward energy prices constantly fluctuate, PSEG believes that a reasonable point in time to measure those prices for the purpose of this case is the date of PSEG's application" makes no sense because fluctuating energy prices are exactly the reason to use an average, and not rely on prices at a single point in time. RCrb at 5.

Rate Counsel also disputes PSEG's argument that the Board should reject the projected prices for capacity recommended by Rate Counsel and the IMM, and instead use PSEG's lower projected prices related to "known changes in the marketplace" while PSEG fails to acknowledge this position is contrary to the position that applicants took in the Board's Resource Adequacy proceeding under Docket No. EO20030203 wherein, PSEG and Exelon argued that, if the nuclear units do not clear the PJM capacity auction due to the Minimum Offer Price Rule, it could cost ratepayers \$207 million annually in additional capacity support payments starting in 2025, based on PSEG projections. RCrb at 6. Rate Counsel witness Mr. Chang observed that it appears that PSEG wishes to understate capacity prices in this proceeding, while overstating them in the Resource Adequacy proceeding and Rate Counsel recommends that the Board choose the BGS proxy price, which represents a middle ground between the high and low prices presented by PSEG. RCrb at 5-6.

With regard to costs, PSEG has relied on the recent Appellate Division decision as establishing that the ZEC Act required the Board to accept PSEG's claimed costs of risks, spent fuel disposal costs, overhead costs, and "cash basis" capital expenditures, but the Board should not rely on the Appellate Division's affirmance of the first ZEC Order as a basis for declining to consider the substantial evidence in the record that the applicants' costs are overstated. Rate Counsel urges the Board to analyze competing evidence in the record on the quantification of risks and other asserted costs, rather than simply adopting the applicants' quantifications. RCrb at 6-7. Rate Counsel emphasizes that in this second ZEC proceeding, the Board must follow an explicit statutory mandate to "ensure that the ZEC program remains affordable" to the States' electric ratepayers by determining what level of subsidy is needed to avoid a shut-down of the nuclear units and asserts that this is a clear direction to the Board to examine and quantify both revenues and costs consistent with the Board's obligation to quantify the subsidy that is actually needed. RCrb at 7.

Rate Counsel dismisses PSEG's argument that the Board should disregard "upside" risks, asserting that what PSEG actually means is that it wants captive ratepayers to guarantee against negative outcomes, with no right to share in the excess profits if costs are lower than expected, or revenues are higher. RCrb at 8.

Rate Counsel argues the Board should not rely on the Appellate Division's recent decision as a basis for disregarding its duty to assure that rates are just and reasonable as Rate Counsel's Petition for Certification to the New Jersey Supreme Court will also challenge this ruling, which it contends effectively overrules the New Jersey Supreme Court's decision in In re Proposed Increase in Industrial Sand Rates, 66 N.J. 12 (1974). RCrb at 10. Rate Counsel further argues that any validity this ruling may have had in the first ZEC qualification period does not exist in the second qualification period because the ZEC Act explicitly directs the Board to consider the "affordability" of the ZEC charge for ratepayers during the second and subsequent ZEC qualification periods. According to Rate Counsel, this is an explicit recognition of the Board's obligation to consider the justness and reasonableness of any ZEC charge to be implemented in these proceedings. RCrb at 10-11.

PSEG maintains that the ZEC subsidy is necessary to ensure that the three nuclear units remain open and that the closure of these units will impact reliability of electric service in New Jersey, and Rate Counsel states that this is an attempt to package a self-created reliability issue as an additional "operational risk" to justify its 10% cost adder, which it then uses to buttress its claim of financial hardship. Rate Counsel claims that this argument is a red herring designed to focus the Board's attention away from PSEG's inability to provide sufficient economic justification for a \$10/MWh ZEC subsidy, but the ZEC statute award criteria does not enumerate reliability as a criterion. RCrb at 14.

The Board's decision on whether to award ZECs should be based on the statutory eligibility criteria, Rate Counsel argues, and not on any manufactured fears regarding whether PSEG's Board of Directors will decide to pull the plug. RCrb at 15.

### **IMM Reply Brief**

In the IMM's Post Hearing Reply Brief, the IMM argues that the applicants fail to demonstrate that Salem 1, Salem 2, and Hope Creek meet the financial criterion under the ZEC Act, because the applicants overstate costs, understate revenues, and overstate risks. IMMrb at 2. As such, the IMM concludes that no subsidy is required because the Applicants fail to demonstrate that the Units will close absent a material financial change. IMMrb at 2. Specifically, the IMM's position is as follows:

It is essential the ZECs Statute be applied correctly, in accordance with its standards and purpose. No subsidies are justified if the need has not been objectively demonstrated under the financial criterion. The record demonstrates no need. The applications should be rejected.

[IMMrb at 7.]

The IMM argues that the applicants underestimate capacity market revenue. Specifically, the IMM explains that the assertion that any changes to market design will reduce prices below the three-year historical average is meritless. IMMrb at 3. Additionally, the IMM claims that the applicants overstate costs. The IMM explained that it included some overhead costs in its analysis, and its position is that “the Board should consider all overhead costs and reject the additional specific, identified overhead costs because they are not relevant to or part of the going forward costs of the Units.” IMMrb at 3. Although the applicants object to the IMM’s use of EUCG data, IMM explained that “EUCG is an industry organization which has been collecting and, through NEI, publishing information about nuclear plant costs since 1986 with the goal to optimize costs and reliability performance of participating plants.” IMMrb at 4.

Additionally, IMM states that the applicants specifically argue, “as the quantity of waste grows so will the ultimate cost of disposing of it safely.” IMMrb at 4. However, the IMM explains that the potential future costs associated with waste generated at the units is speculative, and the applicants have provided no evidence that they will bear these costs during the period of the requested subsidy or that they will ever bear these costs.

The IMM also states that the applicants incorrectly claim that the IMM excluded operational risks, market risks, and other non-realized costs from its analysis. IMMrb at 4. However, the IMM asserts that it addressed risk, and concluded that, “the mean value of expected costs could reasonably be expected to decrease, based on PSEG’s actual experience during the first year of the first eligibility period.” IMMrb at 4-5.

The IMM states that the applicants misstate revenue related risk. IMMrb at 5. The IMM explained that, “the mean value of expected revenues could reasonably be expected to increase, based on the fact that demand continues to recover from the pandemic related levels of 2020 and based on the forthcoming changes to PJM’s energy market,” and as such, the IMM “conservatively evaluates the cost of risk for revenues as zero.” IMMrb at 5. With regard to the applicants’ assertions that revenues are low and could be lower, and that there are known market design changes that are likely to increase energy market prices in significant ways, the IMM states that the applicants fail to account for the impact of market design changes, which are likely to increase energy revenues, including market rule changes regarding reserve pricing and fast start pricing. IMMrb at 5. As explained by the IMM, “[i]t is not reasonable to simply assume that energy market traders have already incorporated the impacts of fast start pricing and reserve pricing changes (ORDC) in forward energy market prices,” because “[t]raders generally respond to current market information.” IMMrb at 5-6. Additionally, applicants claim hedging is only possible “at the forward market price level, not at the higher level at which the IMM says the forward market should be.” IMMrb at 6. The IMM explains that hedging by selling forward will be at the forward market price level, which is expected to increase. IMMrb at 6. Therefore, “[i]f the applicants believed themselves to be fully hedged at defined forward prices, they would not assert the need to be paid for energy market risk.” IMMrb at 6.



The IMM argues that the applicants cost adder is arbitrary. IMMrb at 6. The IMM claims that the applicants do not provide any evidence supporting the assertion that an arbitrary adder is related to risks faced by the plants. IMMrb at 6. The IMM also claims that the applicants misstate market risk. IMMrb at 7. The IMM explains that market risk analysis includes a complete analysis of risk and determines that the appropriate value of risk is negative. The IMM states, “[r]ather than directly addressing the expected distribution of market outcomes, applicants assert a naïve and incorrect definition of risk under which customers would be required to guarantee applicants positive outcomes regardless of actual market results.” IMMrb at 7. The IMM explains that since the Units are not regulated utilities, they operate in markets where there are no guaranteed rates of return, and also, no limits on returns. IMMrb at 7. As such, the IMM explains that, “[t]he ZECs Statute does not reregulate the Units under cost of service and does not otherwise provide guaranteed returns,” but instead, “provides subsidies only as needed to offset proven market exit signals.” IMMrb at 7. And as claimed by the IMM, “[n]o such signals have been proven.” IMMrb at 7.

### **Levitan Report**

In addition to the brief submissions from the parties, the Board received eligibility reports prepared by Levitan, and attached to the end of this order. Levitan, in its report, analyzes the confidential financial submissions from the applicants, and the eligibility criteria for the ZEC Act.

## **V. DISCUSSION AND FINDINGS**

Rate Counsel and intervenors argue that the Board must harmonize the ZEC Act with provisions of EDECA, and that ZECs may not be issued if it does not result in rates that are just and reasonable. Before addressing the eligibility factors under the ZEC Act, we will address these arguments.

Rate Counsel argues that the Board is obligated by N.J.S.A. 48:2-21(b) to ensure that rates we approve are just and reasonable. N.J.S.A. 48:2-21(b) requires the Board to fix just and reasonable rates after hearing, upon notice under certain circumstances not applicable here. This authority is limited to situations where the Board “initiates such a proceeding” or when a public utility files a “complaint.” Ibid.; see also ZEC I Affirmance, (slip op. at 45). Furthermore, N.J.S.A. 48:2-21 applies only to entities whose rates are regulated by this Board, not unregulated nuclear merchant generators like applicants. While the limitations of N.J.S.A. 48:2-21 explicitly apply to rates set following complaint or on our own motion, nothing in N.J.S.A. 48:2-21 limits the Legislature’s ability to award subsidies or to otherwise enact legislation having some impact on rates. See In re Proposed Increased Intrastate Indus. Sand Rates, 66 N.J. 12, 19-20 (1974) (noting the power to set rates is a legislative function).

This proceeding under the ZEC Act is not a rate hearing pursuant to N.J.S.A. 48:2-21(b). It was not initiated by our own motion, nor was it initiated by a complaint by a public utility. Instead, these actions were initiated pursuant to the ZEC Act, N.J.S.A. 48:3-87.3 et seq. Our task under the ZEC Act is not to determine the value of utility property, examine utility expenses, fix a rate of return for investors, and determine what rate a public utility may charge its customers. See In re Jersey Cent. Power & Light Co., 85 N.J. 520, 529 (1981). Instead, this proceeding is an “implementation of the ZEC program under the ZEC Act, which was enacted decades after N.J.S.A. 48:2-21(b), and eligibility determinations on the three ZEC applications . . . .” ZEC I Affirmance, (slip op. at 46). Accordingly, we hold that N.J.S.A. 48:2-21 is inapplicable to these proceedings under the ZEC statute.

In addition to rejecting the notion that N.J.S.A. 48:2-21 applies to this case, we further decline the invitation to somehow harmonize the provisions of N.J.S.A. 48:2-21 with the provisions of the ZEC Act. The ZEC Act does not mention N.J.S.A. 48:2-21, nor do the statutes serve similar purposes. N.J.S.A. 48:2-21 sets forth the manner in which we may exercise ratemaking power delegated to us by the Legislature, on our own motion, or by complaint. The ZEC Act provides for the possibility of a subsidy to certain nuclear power plants who meet designated criteria in order to further New Jersey's goals regarding fuel diversity and emissions reduction. See N.J.S.A. 48:3-87.3(b)(1), (7). The two statutes serve separate purposes, and we decline, as did the Appellate Division in the ZEC I Affirmance, to attempt to harmonize the two statutes. See ZEC I Affirmance, (slip op. at 46) ("the fact that the acts were not enacted during the same time and make no specific references to each other further indicates that they were not intended to be read in pari materia) (quoting Richard's Auto City v. Dir., Div. of Taxation, 140 N.J. 523, 540 (1995)).

Finally, we note that N.J.S.A. 48:2-21 is a statute which generally applies to all rate cases initiated by our own motion, or by complaint, and requires us to fix just and reasonable rates, which is a fact-specific inquiry unique to each rate case. The ZEC Act, however, contains no mention of just and reasonable rates; instead, its focus is on creating a ZEC program, and setting forth the specific criteria for evaluation of applications for ZECs, which we discuss below. In statutory construction, "a specific statute generally overrides a general statute." State v. Robinson, 217 N.J. 594, 609 (2014). The Legislature set forth specific eligibility criteria in the ZEC Act, which we will apply to the applicants' submissions, rather than applying the general just and reasonable standard applicable to rate cases initiated pursuant to N.J.S.A. 48:2-21.

The Act includes five criteria that the Board must review to determine eligibility for a nuclear unit requesting a ZEC subsidy. In order to be certified to be eligible to receive ZECs, a nuclear plant must meet the following five eligibility criteria:

- (1) be licensed to operate by the United States Nuclear Regulatory Commission by the date of enactment of this act and through 2030 or later;
- (2) demonstrate to the satisfaction of the board that it makes a significant and material contribution to the air quality in the State by minimizing emissions that result from electricity consumed in New Jersey, it minimizes harmful emissions that adversely affect the citizens of the State, and if the nuclear power plant were to be retired, that that retirement would significantly and negatively impact New Jersey's ability to comply with State air emissions reduction requirements;
- (3) demonstrate to the satisfaction of the board, through the financial and other confidential information submitted to the board pursuant to subsection a. of this section, and any other information required by the board, which information 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, 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 cover its costs including its risk-adjusted cost of capital, and that the nuclear power plant will cease operations within three years unless the nuclear power plant experiences a material financial change;

(4) certify annually that the nuclear power plant does not receive any direct or indirect payment or credit under a law, rule, regulation, order, tariff, or other action of this State or any other state, or a federal law, rule, regulation, order, tariff, or other action, or a regional compact, despite its reasonable best efforts to obtain any such payment or credit, for its fuel diversity, resilience, air quality or other environmental attributes that will eliminate the need for the nuclear power plant to retire, except for any payment or credit received under the provisions of this act; and

(5) submit an application fee to the board in an amount to be determined by the board, but which shall not exceed \$250,000, to be used to defray the costs incurred by the board to administer the ZEC program.

It is undisputed that the applicants have satisfied criteria 1, 4, and 5 of the statute—they are licensed to operate by the United States Nuclear Regulatory Commission through 2030 or later; receive no payment or credit from government entities; and have each submitted the application fee. See N.J.S.A. 48:3-87.5(e)(1), (4), (5). Therefore, we **HEREBY FIND** that the applicants have satisfied these criteria.

Rate Counsel and intervenors contend that the applicants have overstated the environmental benefits of the nuclear plants. Having thoroughly reviewed the record, and having received the advice of our professional consultant and Staff, we conclude that all three plants “make a significant and material contribution to the air quality in the State by minimizing emissions that result from electricity consumed in New Jersey,” and that retirement of any one of the plants would significantly and negatively impact New Jersey’s ability to comply with state air emissions targets. See N.J.S.A. 48:3-87.5(e)(2). The environmental studies submitted with the applications indicate that retirement of any one plant will result in significant increases in greenhouse gas emissions, and in ozone levels. Accordingly, we **HEREBY FIND** that the applicants have satisfied the environmental criteria of the ZEC Act.

The only remaining eligibility criteria under the ZEC Act is the financial criteria contained at N.J.S.A. 48:3-87.5(e)(3). The applicants submitted voluminous financial information in their applications, and comprehensive responses to discovery and data requests. During our review of the applications and consideration of the eligibility criteria, the Board was assisted by our Staff and consultant, Levitan. We also had the benefit of hearing public comments, and live testimony from the parties’ witnesses. After a careful and thorough review of the administrative record, we find that the plants are not projected to fully cover their costs and risks, and that “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[.]” See N.J.S.A. 48:3-87.5(e)(3). Accordingly, we **HEREBY FIND** that the applicants have satisfied the financial criteria of the ZEC Act.

The Board has reviewed the LAI report attached to this Order. LAI questions whether some costs should be included in the analysis regarding the financial need for ZECs. For instance, LAI characterizes the costs of operational risk “as a prudent generation planning and asset management parameter but not as a cost actually incurred.” LAI at 26. They further note that the cost of operational risk may not necessarily be avoided by ceasing operations. LAI at 26. Likewise, LAI characterizes the cost of market risk as a useful planning parameter, but not a cost that could be avoided by ceasing operations; LAI questions whether market risks should be included in the Board’s consideration of ZECs. LAI at 29. LAI also questions whether spent nuclear fuel costs are true costs, as PSEG is not presently incurring these costs, and it is unclear to LAI when these costs may begin to accrue again. LAI at 23-24. In this regard, Rate Counsel and the IMM both argue that we should disregard the applicants’ claimed costs for operational and market risks, and for spent nuclear fuel. Based on the clear text of the statute, they are wrong.

The Legislature was clear and specific regarding the criteria according to which the applicants were to be evaluated and the time frame in which the Board was to make a determination. N.J.S.A. 48:3-87.5(a) requires the applicants’ cost projections to include “operation and maintenance expenses, fuel expenses, including spent fuel expenses, non-fuel capital expenses, fully allocated overhead costs, the costs of operational risks and market risks that would be avoided by ceasing operations.” See N.J.S.A. 48:3-87.5(a); see also ZEC I Affirmance, (slip op. at 35). As the Appellate Division recognized, had the Legislature wanted us to exclude “operation and maintenance expenses, fuel expenses, including spent fuel expenses” from our overall consideration of costs, there would have been no need for the Legislature to require the applicants to submit the information to the Board. ZEC I Affirmance, (slip op. at 36).

As we recognized in ZEC I, the process and procedures outlined in the Act are a deviation from the usual process and procedures that the Board follows when the Board receives an application from the utilities it regulates. As already discussed, applicants for ZECs are not regulated utilities and therefore are not subject to EDECA and the Board’s regulations. Specifically, the ZEC applicants do not have authorized rates of return nor are they subject to rate cases. See ZEC I Affirmance, (slip op. at 45-46) (discussing the differences between rate hearings under N.J.S.A. 48:2-21(b) and ZEC eligibility determinations under N.J.S.A. 48:3-87.5). Hence, the Act alone controls our analysis as to eligibility and the amount of any ZEC awarded.

As we determined in ZEC I, the Act requires us to consider operational and market risks. Under section 3.e(3) of the Act, PSEG must demonstrate that each “... nuclear power plant is projected to not fully cover its costs and risks ....” The “risks” were defined in the Act to include “operational risks,” i.e., operating costs higher than anticipated, and “market risks” i.e., market energy and capacity price volatility. The Board accepts the determination of the Act that these factors must be considered in determining eligibility for ZECs. It clearly is within the Board’s authority to determine the weight that should be given to these factors. As defined in the Act, “operational risks” include, but are not limited to, 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. N.J.S.A. 48:3-87.5(a). The Act also defines “market risk” as including, but not limited to, “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.” Ibid.

As the Appellate Division explained, the Legislature clearly tasked us with considering the applicants' costs and risks:

The plain language of the subsection makes clear that the Legislature intended for the Board to consider the applicants' "costs and risks" when determining eligibility. Had the Legislature intended for the Board to exclude the applicants' operational and market risks when analyzing financial eligibility under subsection (e)(3) and to instead assess only whether the applicants were "projected to not fully cover [their] costs," it would not have included the words "and risks" after "costs." In our view, to adopt Rate Counsel's position that the Board should have accepted the experts' methodology would render the Legislature's use of the words "and risks" in subsection (e)(3) meaningless, contrary to established principles of statutory construction.

[ZEC I Affirmance, (slip op. at 35).]

As the Appellate Division recognized, "there would have been no need for the Legislature to require applicants to provide information about their operational and market risks . . . or to define those terms" if the Board were supposed to exclude them from its consideration. See ZEC I Affirmance, (slip op. at 36).

Based upon the specific language in the Act, therefore, the Board believes that the Legislature specifically intended that these considerations be accounted for in the Board's review of the ZEC applications and that the Board must consider these risks along with other factors, including fuel diversity, resiliency, and the impact of nuclear power plant retirement on RGGI, New Jersey's economy, carbon, and the Global Warming Response Act.

We note that the parties disputed both the type of cost and risk that this Board may consider, and also the amount of costs, including the cost of risks, and revenues that the applicants will receive in the future. Our review of the "financial and other confidential information" submitted throughout this proceeding "demonstrates to the satisfaction of the board . . . 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." See N.J.S.A. 48:3-87.5(e)(3). The applicants, therefore, have satisfied all of the eligibility criteria under the Act, and we are required to award ZECs. See N.J.S.A. 48:3-87.5(g)(1), (h)(2). Our task under the statute then becomes deciding the ZEC charge. Under the statute, we may reduce the ZEC charge if "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 . . ." N.J.S.A. 48:3-87.5(j)(3)(a). While the financial analysis prepared by some parties, Levitan, and our Staff might indicate that a lesser ZEC charge may provide enough of a market signal to keep the plants in operation, that is not our inquiry. Instead, our inquiry is whether a reduced ZEC charge is "sufficient to achieve the State's air quality and other environmental objectives by preventing the retirement of the nuclear power plants . . ." Ibid. Preservation of the fuel diversity, air quality, and environmental attributes of the nuclear power plants is the aim of the ZEC Act, and we are not persuaded that a reduced ZEC charge will be "sufficient" to prevent the retirement of the nuclear plants. Accordingly, we decline to reduce the ZEC charge pursuant to N.J.S.A. 48:3-87.5(j)(3)(a).

In coming to a decision, the Board has considered the legitimate policy goals of the State and evaluated foreseen impacts on fuel diversity, fuel security, and compliance with State environmental goals, such as the GWRA and the NAAQS. If any of the three units were to retire, additional resources would be required to replace their output. Although solar power in New Jersey could provide some additional supply, it is not yet sufficient to alleviate the loss of base-load from the nuclear units. Additionally, offshore wind energy in New Jersey is just starting, and while, in the future, it should have the ability to provide significant energy into PJM and the state, the capacity is not currently available. Thus, if any or all three units close, the replacement power sources would increase carbon and other harmful emissions to the environment, which is in contravention of the State's stated goal of carbon reduction, as well as other pollutants in the state. With the loss of nuclear energy sources, New Jersey would become reliant on fossil fuel plants to make up for the loss of zero-emission capacity over the next three years. As a result, it would likely be more difficult for New Jersey to meet its obligations under the GWRA and NAAQS and to reach the State's goal of 100% clean energy by 2050, which would be harmful to the citizens of this state in particular and the environment as a whole.

In conclusion, the Board **HEREBY FINDS** that Hope Creek has satisfied the eligibility criteria under the ZEC Act for the second eligibility period. See N.J.S.A. 48:3-87.5(e). After carefully reviewing all of the information and considerations presented, the Board **HEREBY DETERMINES** that Hope Creek is eligible to receive the maximum amount of ZECs authorized by the Legislature for the second eligibility period. As such, the Board **HEREBY ORDERS** that Hope Creek be awarded ZECs in accordance with the Act.

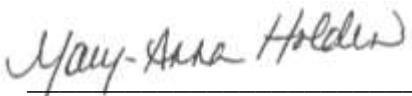
This Order shall be effective on April 27, 2021.

DATED: April 27, 2021

BOARD OF PUBLIC UTILITIES  
BY:



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PRESIDENT



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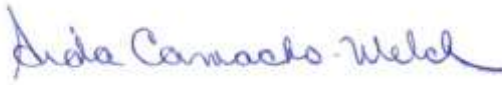


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COMMISSIONER



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\_\_\_\_\_  
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# **New Jersey Zero Emission Certificate Program**

## **Hope Creek Application Report on Eligibility and Cost Projections**

### **Public Version**

*prepared for the*

New Jersey Board of Public Utilities

April 8, 2021

**LEVITAN & ASSOCIATES, INC.**

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## I. Executive Summary

### Background

On May 23, 2018, New Jersey Governor Phil Murphy signed into law L. 2018, c. 16 (C.48:3-87.3 to -87.7) establishing Zero Emission Certificates (“ZECs”) for eligible nuclear power plants (“ZEC Act”) in recognition of nuclear power plants’ air quality, fuel diversity, and other environmental benefits. The ZEC Act identifies the basic steps for the New Jersey Board of Public Utilities (“Board”) to utilize in establishing a ZEC program, including program logistics, funding, costs, application, eligibility requirements, selection process, and the timeframes for meeting several requirements. (N.J.S.A. 48:3-87.5) On August 29, 2018, the Board issued an Order in Docket No. EO18080899 (“ZEC Order”) directing Staff to establish a ZEC program and directing the four investor-owned electric distribution companies (“EDCs”) to file tariffs to collect \$4/MWh from their customers to purchase ZECs from eligible nuclear plants. On April 18, 2019, the Board determined that Hope Creek, Salem 1, and Salem 2 were eligible to receive ZECs for an initial three-year eligibility period through May 2022. Hope Creek received \$90.7 million in the period June 2019-May 2020.

In Orders dated May 20, and August 12, 2020 in Docket No. EO18080899, the Board approved and issued the ZEC application format for the second eligibility period of June 2022-May 2025 and established a procedural schedule. The Board has discretion to set appropriate ZEC payment in the second and succeeding eligibility periods, up to the \$300 million annual cap established by the ZEC Act, provided that the ZEC payments will be sufficient to prevent the retirement of the nuclear plants. PSEG Nuclear LLC (“PSEG”), as the owner and operator of the Hope Creek nuclear power plant, submitted its application on October 1, 2020.<sup>1</sup> The Board reviewed Direct Testimony filed in January 2021 and responses to discovery requests in February and March, held a one-day hearing on March 8, 2021, accepted post-hearing briefs and reply briefs, and intends to make its decision on or before April 27, 2021.

Levitan & Associates, Inc. (“LAI”) was selected by the Board to work with Staff to evaluate the applications and determine the eligibility of nuclear power plants for ZECs. This report presents LAI’s evaluation of the Hope Creek power plant for the second eligibility period. The purpose of this report is to memorialize our conclusions as to whether the Hope Creek application is complete and satisfies the ZEC program requirements per Board Orders, and to provide our observations on the various financial inputs that will determine Hope Creek’s eligibility to receive ZECs.

### Completeness Review

LAI and Staff reviewed the Hope Creek application submitted by PSEG. Based on our review, LAI prepared discovery requests for PSEG to obtain additional information or to clarify submitted information. We reviewed PSEG’s responses and found that the Hope Creek application, supplemented by this additional information, is complete as required under the ZEC program.

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<sup>1</sup> PSEG submitted separate applications for Salem 1 and Salem 2, supplemented with responses to discovery requests and with information submitted by Exelon Generation LLC, the minority owner. We prepared two companion eligibility reports for Salem 1 and Salem 2. In our eligibility reports, LAI occasionally refers to PSEG Nuclear’s parent company, Public Service Enterprise Group, as PSEG, e.g., PSEG Form 10-K reports.

### Evaluation Criteria

In its Order of November 19, 2018, the Board identified twenty criteria to be reviewed once an application is deemed to be complete. LAI confirmed that PSEG satisfactorily addressed all these criteria.

### Eligibility Evaluation

Section 3.e of the ZEC Act specifies five criteria in order to "...be certified by the [B]oard as an eligible nuclear power plant." Each criterion is addressed below.

(1) Hope Creek is "...licensed to operate by the United States Nuclear Regulatory Commission by the date of enactment of this act and through 2030 or later..." We have confirmed the Nuclear Regulatory Commission ("NRC") renewed the original operating license for Hope Creek that will now expire in 2046.

(2) Each plant must "...demonstrate to the satisfaction of the [B]oard that it makes a significant and material contribution to the air quality in the State by minimizing emissions..." PSEG submitted emission estimates from its consultant that quantified the near-term increase in emissions from fossil-fueled plants to replace the generation lost through the retirement of Hope Creek. These fossil-fueled plants are primarily located in New Jersey and the surrounding parts of the Mid-Atlantic Area Council ("MAAC") region of PJM Interconnection LLC. ("PJM"). The retirement of Hope Creek would increase emissions in New Jersey and contribute to a deterioration of air quality in the State.

(3) Consistent with section 3.a of the ZEC Act, PSEG provided "...certified 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..." to demonstrate "...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."<sup>2</sup> The costs were defined in the ZEC Act to include "operational risks," i.e., operating costs higher than anticipated, and "market risks," i.e., market energy and capacity price volatility.<sup>3</sup>

In its application, PSEG asserted that Hope Creek will not fully cover its costs and risks, as defined in the ZEC Act, for the second eligibility period. Our observations regarding PSEG's projection of Hope Creek revenues are as follows:

- PSEG's initial projections of energy revenues in its application were based on expected energy generation and May 29, 2020 forward energy prices. Forward energy prices have increased since then and PSEG provided updated generation, forward energy prices, and energy revenue projections as of September 30, 2020. We found that PSEG's (i) updated forecast of energy generation is reasonably consistent with historical generation, (ii) updated forward energy prices reasonably reflect market prices at that time, (iii) the adjustment from zonal forward

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<sup>2</sup> [https://www.njleg.state.nj.us/2018/Bills/AL18/16\\_.HTM](https://www.njleg.state.nj.us/2018/Bills/AL18/16_.HTM)

<sup>3</sup> *Id.* The ZEC Act provides an alternative basis for a nuclear plant to be deemed eligible for ZECs if the plant "...is projected to not cover its costs including its risk-adjusted cost of capital..." PSEG did not seek certification under this alternative basis, so LAI did not evaluate PSEG's risk-adjusted cost of capital.

prices to the Artificial Island nodal bus prices was reasonable, and (iv) the resulting updated forecast of Hope Creek energy revenues is reasonable.

- PSEG’s projection of capacity prices was lower than recent historical clearing prices for the EMAAC LDA.<sup>4</sup> PJM has conducted Base Residual Auctions (“BRAs”) that have established capacity prices through the 2021-2022 Energy Year but not for the Energy Years in the second eligibility period.<sup>5</sup> Utilizing higher capacity prices set by the Board to evaluate Round 2 offshore wind proposals would increase projected Hope Creek capacity revenues by 21.1%.<sup>6</sup> PSEG assumed an unforced capacity (“UCAP”) quantity consistent with previous years.

PSEG provided its initial projection of Hope Creek labor and material costs, along with other out-of-pocket costs actually incurred, in its application and an updated projection of incurred costs in its January 22, 2021 responses to Staff Discovery Requests. Some of these incurred costs would continue after retirement but would be avoidable because PSEG intends to fund them from Hope Creek’s Decommissioning Trust Fund (“DTF”). The updated projection of incurred costs was generally consistent with historical reported incurred costs after accounting for refueling outage years.

A key area for Board inquiry relates to costs defined by the ZEC Act and claimed by PSEG, but which are not actually incurred as out-of-pocket costs or included in the financial statements (as a line item cost or in the notes) of its parent company, Public Service Enterprise Group. These include spent nuclear fuel (“SNF”) disposal costs and the costs of operational risks and market risks, which we collectively refer to as “non-incurred costs.” PSEG did not provide evidence that these non-incurred costs are incurred or accrued for future disbursement. Our evaluations of the individual non-incurred costs are as follows.

- The U.S. DOE stopped collecting a fee to cover SNF disposal in 2014 and has not announced plans for future collections. Historical financial data for Hope Creek have not included these costs since 2014 and PSEG is not accruing these costs or disclosing them in the notes to its financial statements. Since SNF disposal costs are not actually incurred, they would not be avoided by ceasing operations.
- Section 3.a of the ZEC Act clarifies that plant costs include “...the cost of operational risks and market risks that would be avoided by ceasing operations...” LAI views these risks as prudent and useful for generation planning and asset management but notes they are not actually incurred and would not be avoided by ceasing operations.

Table 1 shows (i) the PSEG’s initial and updated financial results (revenues less costs and subsidies) for Hope Creek and (ii) the individual impacts and combined impact on Hope Creek’s updated financial results (on total dollar and \$/MWh bases) for each Energy Year if the Board decides to fully adopt the

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<sup>4</sup> The Eastern Mid-Atlantic Area Council (“EMAAC”) locational deliverability area (“LDA”) includes New Jersey, the metropolitan Philadelphia area, and the Delmarva Peninsula. Hope Creek is in the PSEG zone within the EMAAC LDA but receives EMAAC capacity prices.

<sup>5</sup> PJM assigns capacity obligations and sets capacity payments for June-May Delivery Years, referred to by PSEG as Energy Years.

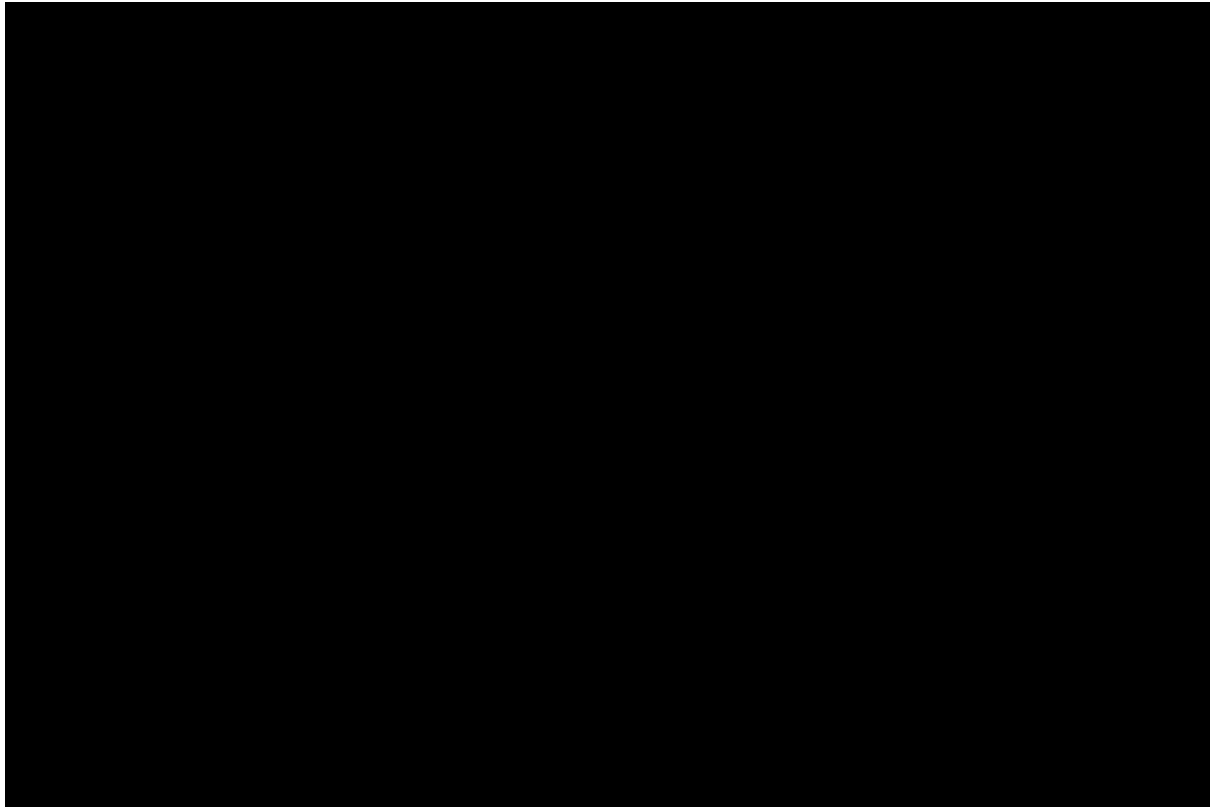
<sup>6</sup> This is the assumption in the Board’s Offshore Wind Solicitation #2 Guidance Document of September 10, 2020.



revenue adjustment and exclude non-incurred costs. If the Board were to accept PSEG’s application with updated generation, energy prices, and costs, Hope Creek is projected to lose a total of [begin confidential] [redacted] [end confidential] over the second eligibility period. However, if the Board were to reject PSEG’s arguments and fully adopt the revenue adjustment and exclude non-incurred costs, Hope Creek’s projected financial results improve but is still projected to lose [begin confidential] [redacted] [end confidential] over the second eligibility period.<sup>7</sup>

Table 1. Impact of Revenue and Non-Incurred Cost Adjustments on Hope Creek Financial Results

[begin confidential]



[end confidential]

The ZEC Act also requires the applicant to demonstrate that “... the nuclear power plant will cease operations within three years unless the nuclear power plant experiences a material financial change...” PSEG provided a Board Resolution dated September 8, 2020 that states [begin confidential] [redacted]

[redacted] [end confidential]<sup>9</sup>

<sup>7</sup> Negative financial results, i.e., costs exceeding revenues, are shown as negative values; revenue increases and cost decreases are shown as positive values. Subsidies are shown as positive values; subsidy decreases are shown as negative values.

<sup>8</sup> The combined impact of the revenue adjustment and cost exclusions result in [begin confidential] [redacted] [end confidential].

<sup>9</sup> See HC-SSA 0001 Attachment A - 2020.09.08 Nuclear Written Consent ZEC.pdf.

The Public Service Enterprise Group Board passed a similar resolution on September 15, 2020.<sup>10</sup> A discussion of the potential retirement of Hope Creek in PSEG's 2019 and 2020 Form 10-Ks are consistent with this Board resolution. We note that corporate boards can change their minds and we are not aware of any strict criteria to determine the materiality of a financial change, e.g., a change in actual or projected market energy and capacity prices.

Furthermore, even if Hope Creek is selected and receives ZEC payments from New Jersey ratepayers, PSEG may retire it if changes in PJM's competitive power market result in inadequate financial performance. According to its 2019 and 2020 Form 10-Ks, PSEG would retire Hope Creek if it is "materially adversely impacted" by changes in commodity prices or in the PJM capacity market construct.

(4) Under section 3.e(4) of the ZEC Act, PSEG is required to "certify annually that the facility does not receive any direct or indirect payment or credit..." from other state or federal agencies. We note that this carries an implicit requirement that PSEG use "...reasonable best efforts to obtain any such payment or credit...that will eliminate the need for the nuclear power plant to retire..." PSEG provided this certification in its Response to Discovery Request: HC-ZECJ-FIN-0015.<sup>11</sup> Assuming the Board decides to award ZEC payments to Hope Creek for the second eligibility period, LAI anticipates that this criterion will be satisfied by PSEG providing annual certifications that they are not receiving any other subsidies.

(5) The Hope Creek application was accompanied by a \$250,000 fee as set by the Board.

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<sup>10</sup> See HC-SSA 0001 Attachment B - 2020.09.15 ZEC Filing Enterprise BOD Resolution.pdf.

<sup>11</sup> HC ZECJ FIN-0015.pdf

## II. Introduction

### Legislative and Regulatory Background

The New Jersey Senate approved the ZEC Act, Public Law 2018, Chapter 16 to revise Title 48 (C.48:3-87.3 to 48:3-87.7) of the New Jersey Revised Statutes, to avoid “[T]he abrupt retirement of existing, licensed, and operating nuclear power plants...” in order to preserve air quality, address climate change, and maintain fuel diversity. The ZEC Act, which was signed into law by New Jersey Governor Phil Murphy on May 23, 2018, directed the Board to create and administer a ZEC program and to conduct an evaluation process to determine if any nuclear power plants are eligible to receive ZEC revenues. In order to be eligible under section 3.a of the ZEC Act, each plant must submit information “...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.”

Under section 3.j of the ZEC Act, each EDC is to file a tariff that will collect \$4/MWh from its retail customers, an amount intended to reflect “...the emission avoidance benefits associated with the continued operation of selected nuclear plants.” The ZEC Act requires the price of each ZEC to be set by the Board by dividing the total dollars collected by the greater of (i) 40% of the State’s total load or (ii) combined generation of the selected nuclear power plants. The resulting ZEC price was approximately \$10/MWh of generation from the eligible nuclear plants for June 2019-May 2020. On April 18, 2019, the Board determined that Hope Creek, Salem 1, and Salem 2 were eligible to receive ZECs for an initial three-year eligibility period through May 2022.<sup>12</sup> The three plants received ZEC revenues totaling \$270.6 million in the twelve-month period June 2019-May 2020.<sup>13</sup> Hope Creek received \$90.7million during that period.

Under section 3.j.(3)(a) of the ZEC Act, the Board “...may, in its discretion, reduce the per kilowatt-hour charge imposed by paragraph (1) of this subsection [\$0.004/kWh] starting in the second three year eligibility period and for each subsequent three year eligibility period thereafter, provided that the [B]oard 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.”

The Board issued its ZEC Order in Docket No. EO18080899 on August 29, 2018 to create the ZEC program for eligible nuclear plants for the first eligibility period.<sup>14</sup> The ZEC Order and successive Orders of November 19, 2018 and February 27, 2019 included an application format for nuclear plant owners,

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<sup>12</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants; Applications for Zero Emission Certificates of Salem 1, Salem 2, and Hope Creek Nuclear Power Plants; BPU Docket Nos. EO18121338, EO18121339, & EO18121337 respectively, Order dated April 18, 2019 (Order Determining the Eligibility of Hope Creek, Salem 1, and Salem 2 Nuclear Generators to Receive ZECs).

<sup>13</sup> Responses to Discovery Request: ZECJ-FIN 22.

<sup>14</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899, Order Initiating the Zero Emission Certificate Program, Designating Commissioner, and Setting Manner of Service and Bar Date, dated August 29, 2018.

directed Board Staff to conduct public hearings, established a comment process, selected a consultant to assist with the application eligibility and ranking process, established evaluation criteria to rank eligible nuclear units, and approved the EDC's recovery of ZEC charges from ratepayers. On April 18, 2019, the Board determined that Hope Creek, Salem 1, and Salem 2 were eligible and would receive ZECs. On July 10, 2019, the Board directed the EDCs to purchase ZECs and pay the three plants for the first eligibility period through May 2022.

In Orders dated May 20 and August 12, 2020 in Docket No. EO18080899, the Board approved and issued the ZEC application format for the second eligibility period through May 2025 and established a timeline for application submittal, evaluation, and ranking.<sup>1516</sup> The Board also established a July 20, 2020 date to accept written comments. Many New Jersey stakeholders submitted comments and reports to the Board, including the PJM Independent Market Monitor ("IMM"), the New Jersey Division of Rate Counsel, PSEG (sole owner of Hope Creek and majority owner of Salem 1&2), and Exelon (minority owner of Salem 1&2), and the PJM Power Providers ("P3") representing generation owners. The Board Order of September 10, 2020 established Docket No. ER20080559 with a procedural schedule designed to ensure final Board action prior to April 27, 2021.<sup>17</sup>

PSEG, as the owner and operator of the Hope Creek nuclear power plant, submitted its public (redacted) and confidential versions of its application on October 1, 2020.

#### Hope Creek Evaluation

Hope Creek is located on the same site as Salem 1 and Salem 2 in Hancocks Bridge, Lower Alloways Creek Township, on the Delaware Bay in south-western New Jersey. The one-unit boiling water reactor utilizes a General Electric Type 4 reactor vessel. Hope Creek is owned and operated by PSEG. A second Hope Creek unit was planned but was cancelled in 1981. Hope Creek received a forty-year NRC operating license and came online on July 25, 1986. In 2009, PSEG applied for a twenty-year license renewal through 2046, which it received on July 21, 2011.<sup>18</sup>

LAI was retained by Board Staff in accord with the Board's Order of August 12, 2020 in Docket No. EO18080899 to provide analytical consulting services in order to assess the eligibility and rank the ZEC applications submitted by the nuclear power plant owners for the second eligibility period. LAI, a management consultancy specializing in the power and fuels industries, has been actively involved in nuclear power economics in other states and evaluated the ZEC applications for the first eligibility period. LAI consultants worked with Board Staff for the second eligibility period to evaluate application

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<sup>15</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants; Application for Zero Emission Certificates of Salem 1, Salem 2, and Hope Creek Nuclear Power Plants: BPU Docket Nos. EO18121338, EO18121339, & EO18121337, respectively, Order dated May 20, 2020 (Order Finalizing the Forward Steps in the ZEC Program and Modifications to the Application).

<sup>16</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899 (August 12, 2020) (Agenda Item 9A).

<sup>17</sup> Docket No. ER20080557 was established for Salem 1 and Docket No. ER20080558 for Salem 2.

<sup>18</sup> <https://www.nrc.gov/info-finder/reactors/hope.html>

eligibility and to develop a ranking methodology to be applied to the eligible applicants. This report presents our evaluation of the Hope Creek application for the second eligibility period.

### III. Completeness per Board's ZEC Program

According to page 10 of the Board's November 19, 2018 Order, "The Eligibility team will first review applications for completeness. If the application is deemed incomplete, the applicant will be contacted, and the application will be rejected. If the application is deemed complete, review of that application will continue." Applicants were required to answer and provide supporting documentation to answer all questions in the ZEC application as approved by the Board. LAI conducted a full review of the applications, supporting documents, and responses to discovery requests submitted by PSEG to ensure the Hope Creek application sections, listed below, were complete. Based on our review of the application and the responses to discovery requests, we found the Hope Creek application to be complete.

- General Applicant Information
- Generation Asset Information and Operation
- ZEC Justification – Financial
- ZEC Justification – Environmental
- Impact of the Unit's Deactivation
- Supplemental Submissions

#### **IV. Application Evaluation Criteria per Board's ZEC Order**

Once each application is "deemed complete," page 10 of the Board's ZEC Order of November 19, 2018 requires that the "...review of that application will continue..." and directs Staff and LAI to "...specifically consider all of the following criteria."

This required information will be utilized to determine if each application meets all of the eligibility criteria established in the Act, beyond the application fee. The evaluation by the Eligibility team will determine either acceptance or denial of each application. An applicant must submit all of the required information to satisfy all of the criteria to be deemed eligible and receive continued review by the 'Ranking' team.<sup>19</sup>

LAI confirms that all of these evaluation criteria, shown in Table 2, have been satisfactorily addressed by PSEG for Hope Creek.

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<sup>19</sup> I/M/O the Implementation of L. 2018, c. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear Power Plants, BPU Docket No. EO18080899, Order Establishing the Program, Application, and Procedural Process, dated November 19, 2018 at 11.

Table 2. ZEC Evaluation Criteria

<b>Application Evaluation Criteria</b>	<b>Addressed by PSEG</b>
the unit's operating expenses versus revenue generated	Yes
the unit's participation in past and project future markets	Yes
avoidable versus operational costs if the unit were to shut down	Yes
historical bids into the capacity and energy markets	Yes
emissions avoided for New Jersey residents if the unit continued operation	Yes
the unit's contribution to New Jersey air quality	Yes
the unit's compliance with NJDEP requirements and criteria	Yes
economic impacts to New Jersey if the unit shuts down	Yes
contribution to fuel diversity in the region and in PJM	Yes
complete financial analysis of the unit and owner (may include parent company and affiliates)	Yes
capital planning and spending of the unit	Yes
maximum capacity and historical output of the unit	Yes
all generation costs of the unit	Yes
annual operation and maintenance ("O&M") costs	Yes
previous, current, and anticipated subsidies received by the unit from private and governmental agencies	Yes
the unit's impact on the capacity market and operations within PJM	Yes
impacts to greenhouse gases ("GHG") in New Jersey if the unit shuts down	Yes
interaction and supplementation of NJ Energy Master Plan ("EMP") and Renewable Portfolio Standards ("RPS")	Yes
the unit's anticipated lifecycle	Yes
the amount of subsidy, if any, required to keep the unit economically viable	Yes



## V. Eligibility Evaluation per Board's ZEC Order

LAI next made a determination regarding the five qualifications specified in section 3.e of the ZEC Act and in section III of the November 19, 2018 Order for each plant to be certified as eligible:

Pursuant to the Act, to be certified as eligible, a plant shall: 1) be licensed by the U.S. Nuclear Regulatory Commission ("NRC") through 2030, 2) demonstrate a significant and material contribution to New Jersey air quality (minimizing emissions), 3) demonstrate anticipated plant shutdown within three years due to its financial situation, 4) certify that the facility does not receive any subsidies from other entities or agencies, and 5) submit an application fee.

### 1) NRC License

LAI confirms that Hope Creek is "...licensed to operate by the United States Nuclear Regulatory Commission...through 2030 or later..." According to current information on the NRC website, the original operating license was renewed in 2011. The Hope Creek operating license expires in 2046.

Hope Creek is currently classified Column 1 by the NRC as meeting or exceeding its operating safety expectations as characterized by the NRC Reactor Oversight Process Action Matrix columns.<sup>20</sup> The NRC characterizes the safety performance of operating reactors through the Reactor Oversight Process Action on a quarterly basis. Column 1 classification in the Reactor Oversight Process Action Matrix indicates that the reactor is operating at the highest level of safety, also referred to as all green performance indicators, and the reactor is subject to routine NRC oversight.

### 2) Air Quality Contribution

The ZEC Act requires that each plant "...makes a significant and material contribution to the air quality in the State by minimizing emissions..." Nuclear generating units submitting applications to receive ZECs must demonstrate that its retirement would have an adverse impact on New Jersey's air quality. Section IV of the ZEC program application directs applicants to provide studies and relevant data that demonstrate the contributions to New Jersey's air quality that result from the operation of the applicant's unit. Since most of the likely replacement generation for a retired nuclear unit in New Jersey will be generation from natural gas and coal-fired generating plants, the emissions associated with this generation will increase relative to the nuclear generation being replaced. The applicant is specifically requested to provide projections of the generation assets, generation and resulting emissions that would fulfill the State's energy and capacity requirements if the applicant's nuclear unit were to be shut down.

#### *Impact of Retirement on Emissions*

As part of its ZEC applications for Hope Creek, Salem 1 and Salem 2, PSEG submitted a study by its consultant, PA Consulting, quantifying the increased generation and subsequent increase in emissions

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<sup>20</sup> <https://www.nrc.gov/reactors/operating/oversight/actionmatrix-summary.html>

over the second eligibility period that would replace lost generation from their retirements.<sup>21</sup> The PA Consulting study quantified the resulting increase in the emissions of CO<sub>2</sub> and other air pollutants in New Jersey, MAAC, other PJM states, New York, and the U.S. portion of the Eastern Interconnection.<sup>22</sup> PA Consulting utilized the AURORA chronological dispatch simulation model to analyze the changes in emissions resulting from removing Hope Creek or removing all three nuclear generating units compared to its Base Case. Given the relative capacity, generation history, and close proximate location of these units, the replacement generation and the emissions increases associated with this replacement generation will be similar for each nuclear unit. The emissions projections by PA Consulting focused on the air quality impacts in New Jersey and also estimated emission increases in MAAC since the majority of the emissions from replacement generation would come from natural gas and coal generating units in MAAC, which will affect air quality in New Jersey.<sup>23</sup>

Table 3 presents the projected increase in emissions over the second eligibility period for New Jersey compared to the PA Consulting's Base Case for the retirement of Hope Creek individually and for the retirement of all three nuclear units ("Full Retirement Case"). Hope Creek's retirement will result in increased emissions of all pollutants in New Jersey, which would contribute to a deterioration of air quality. Hope Creek's retirement would increase CO<sub>2</sub> emissions in New Jersey over the second ZEC eligibility period by 4.1% or 2.8 million tons. The retirement of all three nuclear units under the Full Retirement Case would result in 8.9 million tons of additional CO<sub>2</sub> emissions.

Table 3. PSEG Projected Increase in New Jersey Emissions over Second Eligibility Period

Scenario	CO <sub>2</sub> (000s tons)	NO <sub>x</sub> (tons)	SO <sub>2</sub> (tons)	Hg (lbs)	PM <sub>10</sub> (tons)	PM <sub>2.5</sub> (tons)
Hope Creek Retirement	2,779 +4.1%	568 +3.7%	57 +1.3%	0.1 +0.1%	168 +4.1%	162 +4.2%
Full Retirement	8,892 +13.2%	2,074 +13.7%	202 +4.7%	0.2 +0.5%	547 +13.2%	526 +13.5%

LAI compared PA emission results shown in the table above to 2019 New Jersey emissions data from the EIA and EPA as a check on their reasonableness.<sup>24</sup> As would be expected, the annualized PA projections differ somewhat from the 2019 comparison year given the projected changes in generation mix over the second eligibility period. The annualized PA emissions projections show slightly more CO<sub>2</sub> emissions than

<sup>21</sup> "The Impact of Nuclear Generation Retirements on Emissions and Fuel Diversity in New Jersey," September 2020. HC-ZECJ-ENV-0001-0082. This study is an update of the PA Consulting study to support the Hope Creek, Salem 1 and Salem 2 applications for the initial ZEC eligibility period.

<sup>22</sup> The other pollutant emissions modeled by PA included NO<sub>x</sub>, SO<sub>2</sub>, mercury ("Hg"), and particulate matter ("PM<sub>10</sub>" and "PM<sub>2.5</sub>"). MAAC includes all or parts of the states of Delaware, Maryland, New Jersey, and Pennsylvania along with Washington, D.C.

<sup>23</sup> Under both the Hope Creek Retirement and the Full Retirement cases prepared by PA, more than 67% of the nuclear replacement generation is from natural gas and coal generating plants in MAAC.

<sup>24</sup> <https://www.eia.gov/electricity/state/newjersey/index.php>; <https://www.epa.gov/egrid/>

in 2019 and somewhat less NO<sub>x</sub> and SO<sub>2</sub> emissions. However, we did not find these differences to be significant regarding the reasonableness of the projections.

#### *Impact on Global Warming Response Act*

New Jersey's Global Warming Response Act ("GWRA") sets greenhouse gas emissions limits for the years 2020 and 2050. The 2020 GWRA emissions limit was set at 125.6 million metric tons (138.4 million tons) of CO<sub>2</sub> equivalent ("CO<sub>2</sub>e"). The New Jersey Department of Environmental Protection ("DEP")<sup>25</sup> reported that in 2018 statewide greenhouse gas emissions were 101.9 million metric tons (112.3 million tons) of CO<sub>2</sub>e, 23.7 million metric tons (26.1 million tons) CO<sub>2</sub>e below the 2020 limit, primarily due to a significant decline in coal-fired generation in the State from 2011 through 2018. However, if the same average annual CO<sub>2</sub>e emissions reductions were to continue, the State would fall more than 10 million metric tons short of the GWRA 2050 goal. After withdrawing from the Regional Greenhouse Gas Initiative ("RGGI") in January 2012, New Jersey rejoined RGGI effective January 1, 2020, through which New Jersey will work with other RGGI states to further reduce greenhouse gas emissions.

#### *Impact on Fuel Diversity*

The ZEC Act established fuel diversity as a part of the eligibility criteria. Fuel diversity spreads the reliability risks associated with fuel supply interruptions, price volatility, and environmental issues across a balance of fuels and generating resource technologies. The PJM IMM, Monitoring Analytics, LLC, has developed a fuel diversity metric, the Fuel Diversity Index ("FDI"), to provide an objective measure of fuel diversity in PJM. Similar to the HHI used to measure market concentration, the FDI is calculated as 1 minus the sum of the squares of the market share of each fuel or generating resource type. FDI measures fuel diversity on a scale of 0 to close to 1.0.<sup>26</sup> The IMM calculated the FDI for PJM in each of the "State of the Market Reports."<sup>27</sup> Since 2000, PJM's FDI has ranged between 0.5 and 0.7 and was 0.7 in the "2019 State of the Market Report" that is considered to reflect a high degree of fuel diversity.

Table 4 provides a breakout of generation by fuel or resource technology in New Jersey for 2019 based on generation data compiled by the EIA.<sup>28</sup> All of the State's nuclear generation was provided by Hope Creek, Salem 1, and Salem 2. Natural gas provided the largest amount of generation while coal has declined significantly in recent years and renewables, primarily wind and solar, are growing. LAI calculated the 2019 FDI for New Jersey as 0.53 compared to a maximum value of 0.83 for a market with six resource technologies of equal market shares, indicating New Jersey was reasonably diversified. In order to assess the impact of the retirement of Hope Creek, LAI calculated the FDI for the Energy Year 2022/2023 based on PA's generation projections. With the retirement of Hope Creek, New Jersey's FDI drops to 0.49 and 23% of the replacement generation would be generated from coal and natural gas generation located in the State. The remaining replacement generation would be generated from outside of New Jersey. When all three of New Jersey's nuclear units are retired, the FDI drops to 0.19 for Energy Year 2022/2023. Retirement of any of these plants will significantly lower New Jersey's fuel

<sup>25</sup> "New Jersey Greenhouse Gas Inventory Mid-Cycle Update Report", February 2021.

<sup>26</sup> An FDI of 0.9 reflects the greatest diversity in a market composed of 10 resources with equal market shares, while an FDI of 0 shows the least diversity with a single resource serving the entire market.

<sup>27</sup> See "2019 State of the Market Report" for PJM, p. 166.

<sup>28</sup> [www.eia.gov/electricity/data/state](http://www.eia.gov/electricity/data/state).

diversity by increasing the share of in-state natural gas generation to as much as 90% in the event all three of the nuclear units would be retired.

Table 4. New Jersey 2019 Generation by Fuel or Resource Type

Fuel Type	Generation (GWh)	Percent
Coal	1,042	1.5%
Natural Gas	40,449	57.0%
Nuclear	26,637	37.5%
Hydro	26	0.0%
Wind & Solar	1,187	1.7%
Other	1,678	2.4%
Total	71,017	100.0%

### 3) Anticipated Plant Shutdown / Certified Cost Projections

As required by section 3.a of the ZEC Act, PSEG provided "...certified 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..." PSEG's cost projections, as submitted and without adjustments, indicate that each "...nuclear power plant is projected to not fully cover its costs and risks..." PSEG's cost projections incorporated "operational risks" to reflect the risk that operating costs will be higher than anticipated and "market risks" to reflect the risks of a forced outage and lower market capacity and energy prices, consistent with the ZEC Act.

#### *Revenue Projections*

PSEG based its initial energy revenue projections on PECO forward zone energy prices as of May 29, 2020, adjusted for the Artificial Island bus, and expected plant generation.<sup>29</sup> PSEG submitted an updated projection of energy revenues based on PECO forward energy prices as of September 30, 2020, close to the date of the PSEG application. We found PSEG's methodology to be reasonable and the initial and updated forward energy prices very close to published (S&P Global Power) forward prices for those dates.<sup>30</sup> PSEG adjusted PECO forward zonal energy prices assuming 2% losses and monthly FTR path congestion to derive energy prices at the Artificial Island bus.<sup>31</sup> We confirmed the reasonableness of

<sup>29</sup> See PSEG Confidential HC-ZECJ-FIN 0013 Parts13andBC13.pdf

<sup>30</sup> S&P Global Market Intelligence provides Power Forwards and Futures Data from OTC Global Holdings (<http://otcgh.com/>), the world's largest independent institutional broker of physical and financial commodity instruments.

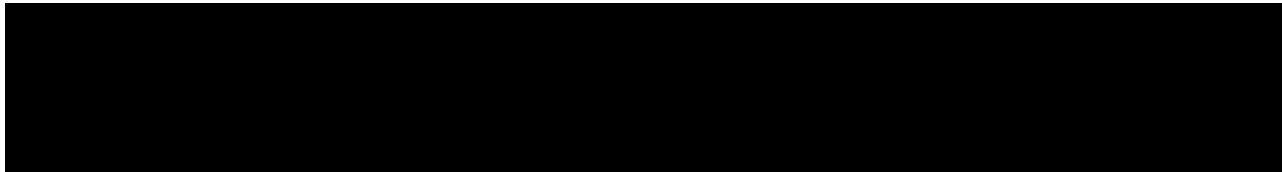
<sup>31</sup> PSEG provided a general overview of its calculations in confidential discovery response HC-ZECJ-FIN 0013 Parts13andBC13.pdf.

PSEG’s adjustments by comparing historical hourly real time locational marginal prices (“LMPs”) for the PECO zone and the Artificial Island bus over the past year.<sup>32</sup>

PSEG’s projected energy revenues also depend on Hope Creek generation during the second eligibility period. We found the PSEG’s initial and updated projections of Hope Creek generation to be generally consistent with the projected generation in PSEG’s 2019 ZEC 1 Application and with reported historical data as shown below.<sup>33</sup>

Table 5. Hope Creek Historical and Projected Generation

[begin confidential]

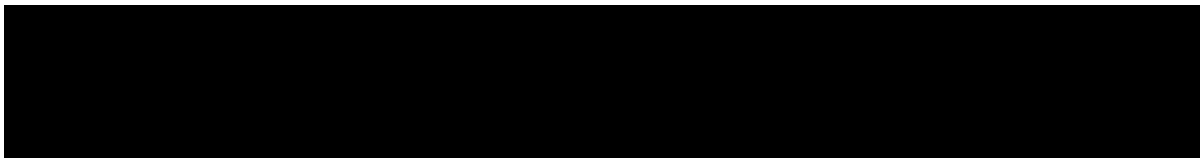


[end confidential]

PSEG’s initial and updated forecasts of Hope Creek energy revenues by Energy Year for the second eligibility period are provided in Table 6 below.

Table 6. PSEG Forecast of Hope Creek Energy Revenues

[begin confidential]



[end confidential]

PSEG based its capacity revenues for Hope Creek on its cleared UCAP and its projection of capacity prices set by PJM BRAs.<sup>34</sup> PSEG assumed a UCAP quantity consistent with previous years. While PJM typically conducts a BRA three years prior to the Delivery Year in which capacity must be delivered, the BRA schedule for the 2022/2023 Delivery Year has been significantly delayed and is expected to be held in May 2021. BRAs for future Delivery Years have also been delayed. As BRA prices have only been set through May 31, 2022, PSEG projected Hope Creek capacity revenues based on its own projection of capacity price of [begin confidential] [redacted] [end confidential] for the next three BRAs and a UCAP value of [begin confidential] [redacted] [end confidential] to calculate capacity revenues of [begin

<sup>32</sup> PSEG provided annual PECO Zone and Artificial Island bus prices in PSEG HC-ZECJ-FIN 0013 Parts13andBC-CONFIDENTIAL.pdf

<sup>33</sup> PSEG provided its 2020 generation forecast in HC-GAIO 0007 UnitGeneration-CONFIDENTIAL.xlsx] Worksheet GAIO-7, and Staff-PS\_0011-UPDATE\_11-updated-answer-Confidential.xlsx. The 2019 generation forecast was provided in RCR-PS-HC-E 0002 SSA 0020 All Q61 Confidential.xlsx (the 2018-2019 values in the 2019 row consists of actuals from June-2018 to September-2018 and forecast for the remaining months).

<sup>34</sup> ZECJFIN-13b (Confidential)

confidential] [REDACTED] [end confidential].<sup>35</sup> PSEG provided the assumptions and an explanation of how it projected BRA prices for Hope Creek in a confidential attachment to the Direct Testimony of Daniel Cregg filed on January 29, 2021. PSEG's projected capacity price is low compared to recent BRA results; the impact of an adjustment is presented on pages 14-15 of this Report.

FERC issued an Order on May 21, 2020 adopting as just and reasonable most of PJM's proposed tariff and operating agreement revisions to the reserve market design in Dockets EL19-58-000 and ER19-1486-000.<sup>36</sup> Nuclear units do not generally provide reserves and these changes are unlikely to have a material impact on Hope Creek's projected energy revenues. The Order directed PJM to implement a forward-looking energy and ancillary services offset ("E&AS Offset"). PJM submitted its proposed E&AS mechanism to be used starting with the 2022-2023 Delivery Year on August 5, 2020<sup>37</sup> and FERC reaffirmed its decision regarding the use of a forward-looking E&AS Offset and dismissed complaints in its Order of November 3, 2020.<sup>38</sup> PJM's revised reserve market design and forward-looking E&AS Offset are likely priced into future energy forwards and other power market products so no adjustment to the Hope Creek certified cost projections is necessary for these revisions.

### *Cost Projections*

PSEG provided an initial projection of incurred and non-incurred costs in its application and an updated projection in Response to Discovery Request: PS-0011.<sup>39</sup> Incurred cost categories include plant labor, O&M, materials, outside services, and corporate support services and allocated overhead that are expensed, plus fuel and non-fuel capital expenditures ("Capex") that are capitalized and depreciated. Many of these incurred costs would continue after retirement but would be avoidable because PSEG intends to fund them from Hope Creek's DTF. Other incurred costs, such as real estate taxes, are minimal and not significant to our evaluation. Non-incurred costs include SNF disposal and the costs of operational and market risks.

LAI compared PSEG's updated projection line-item costs to the reported historical annual costs.<sup>40</sup> For costs that are actually incurred, we found that historical costs generally aligned with projected costs after accounting for refueling outage years. Non-incurred costs could not be compared with historical data and raise concerns as explained below.

Table 7. PSEG Forecast of Hope Creek Costs

[begin confidential]

<sup>35</sup> PSEG used the term "Energy Year" that appears to be identical to "Delivery Year," i.e., June-May.

<sup>36</sup> <https://www.ferc.gov/sites/default/files/2020-06/E-3-052120.pdf>

<sup>37</sup> <https://www.pjm.com/directory/etariff/FercDockets/4681/20200805-el19-58-003.pdf>

<sup>38</sup> <https://www.pjm.com/-/media/documents/ferc/orders/2020/20201103-el19-58-001-er19-1486-001.ashx>

<sup>39</sup> PSEG provided a complete initial summary of revenues, costs, and MWh (all in energy years) in Response to Discovery Request: Staff-PS-0010 (Staff-PS 0010 10-Result-updated-Confidential.xlsx). Updated values were provided in Staff-PS 0011-UPDATE 11-updated-answer-Confidential.xlsx.

<sup>40</sup> HC-ZECJ-FIN 0006 6-10-yrOMand Capital7-CONFIDENTIAL.xlsx and HC-ZECJ-FIN 0007 7Answer-all units-CONFIDENTIAL.xlsx

[end confidential]

We also had concerns about the portion of PSEG's costs that would be avoided in the event the nuclear power plants ceased operating and the costs that would continue and not be avoided. As noted above, section 3.a of the ZEC Act specifically addressed costs "that would be avoided by ceasing operations" and the Board also differentiated between "avoidable versus operational costs" on page 11 of its November 19, 2018 Order. Utilizing avoided costs is consistent with the Board's past support of net avoidable cost rate ("ACR") as an appropriate means to measure a generator's going-forward costs, i.e., the marginal operating costs of a generating unit.

#### *Potential Revenue and Cost Adjustments*

The ZEC Act requires applicants to submit financial information, including "...certified 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..." Section III of the ZEC Application, Appendix B to the Board's November 19, 2018 ZEC Order also addressed costs being avoidable, requiring that PSEG "[d]emonstrate that the Unit is financially unviable, i.e., if the Unit's revenue and funding outweighs the avoided costs expenses (operations, training, engineering, materials, fuel, etc.) of the Unit, for each year through 2030." Differentiating between avoidable and unavoidable costs is consistent with the Board's past support of net ACR to measure a generator's going-forward costs, i.e., the marginal operating costs.

As with our 2019 Report, LAI evaluated PSEG's forecasted revenues and costs, whether they are true out-of-pocket costs and would be avoidable in the event of retirement, and how excluding them would affect ZEC payments for Hope Creek and the necessary collections from ratepayers.

#### (a) Energy Revenues

As explained above, PSEG based its initial forecast of energy revenues for the three nuclear plant applications, on PECO zonal forward energy prices, adjusted for actual prices at the Artificial Island bus, as of May 29, 2020. PSEG updated its forecast of energy prices and energy revenues based on PECO forward energy prices as of September 30, 2020, close to the October 1, 2020 date of PSEG's Hope Creek application. We found that PSEG's (i) forecast of energy generation is reasonably consistent with historical generation, (ii) the updated forward energy prices reasonably reflect market prices at that time, (iii) the adjustment from zonal forward prices to the Artificial Island nodal bus prices is reasonable, and (iv) the resulting updated forecast of Hope Creek energy revenues is reasonable. We note that forward energy prices shift over time and generally have declined in PJM over the past few years. Utilizing more recent forward PECO energy prices does not significantly change the overall Hope Creek results.

#### (b) Capacity Revenues

As confirmed in PJM's 2021-2022 RPM Resource Model, Hope Creek is located in the PSEG zone but is entitled to EMAAC capacity prices because it is connected to the 500 kV transmission

system.<sup>41</sup> PSEG assumed an EMAAC capacity price of [begin confidential] [redacted] [end confidential] for Hope Creek capacity revenues during the second eligibility period. This value is lower than the \$157.79/MW-day EMAAC average over the last three BRAs because it incorporates “significant and known inputs that drive capacity pricing.”<sup>42</sup> PJM has not conducted a BRA since 2018, when annual auctions were delayed due to FERC’s determination that capacity market rules proposed by PJM in dockets EL16-49 and EL18-178 were unfair in their treatment of state-subsidized resources. PJM is expected to conduct the 2022/2023 BRA in May 2021 and the next two BRAs in December 2021 and May 2022, respectively.

In considering the BRA clearing prices that will determine Hope Creek’s capacity revenues over the second eligibility period, we note that the Board will evaluate Round 2 offshore wind projects interconnecting to the EMAAC LDA using a capacity price of \$157.79/MW-day for 2022/2023, the average for the last three BRAs, plus 2% inflation for succeeding years.<sup>43</sup> Based on this assumption, Hope Creek capacity revenues will increase by [begin confidential] [redacted] [end confidential] over the second eligibility period. The average annual subsidy requirement would drop from [begin confidential] [redacted] [end confidential] utilizing the Board’s capacity price assumption.

Table 8. Impact of Higher Capacity Prices on Hope Creek Financial Results

[begin confidential]

[end confidential]

(c) Avoidable Operation and Maintenance Expenses

Some level of O&M expenses at the three nuclear plants will be required for SNF management and other decommissioning activities after they shut down and cease commercial operation. In its Response to Discovery Request: HC-IUD-003, PSEG provided a report, [begin confidential]

[redacted]  
[redacted]  
[redacted]

<sup>41</sup> <https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2021-2022/2021-2022-rpm-resource-model.ashx?la=en>

<sup>42</sup> Confidential Attachment A to the Direct Testimony of Daniel Cregg.

<sup>43</sup> Footnote 35 in the Board’s Offshore Wind Solicitation #2 Guidance Document of September 10, 2020.



[REDACTED]

[REDACTED] [end confidential] Information on the NRC website estimates a longer period: “Fuel is typically cooled at least 5 years in the pool before transfer to cask.”<sup>45</sup> Thus, the duration of post-operation O&M for SNF management and other decommissioning activities is likely to be in the range of 3½ -5 years. The TLG Study estimated that once SNF management and other initial decommissioning activities are completed, annual Hope Creek O&M cost will drop and remain at a low level. LAI recognizes the [begin confidential] [REDACTED] [REDACTED] [end confidential] is detailed, site-specific, prepared by a qualified nuclear engineering company, and consistent with NRC requirements. Thus, we can adopt these O&M costs estimated by TLG for post-operation SNF management and other decommissioning activities.

The ZEC Act requires that the “certified cost projections” identify expenses and costs “that would be avoided by ceasing operations.” In its Response to Discovery Request: HC-IUD-0005, PSEG claimed “If Hope Creek is deactivated, all costs related to the Hope Creek Unit would be avoidable with the exception of a portion of Allocated Overhead Costs that would remain with the owner post shutdown.” PSEG based this claim on its intention to request an exemption from the NRC to utilize a portion of the DTF to cover its SNF management and other decommissioning costs.

According to NRC regulation 10 CFR 50.82 Termination of License, the DTF is restricted to “legitimate decommissioning activities” that is defined in 10 CFR 50.2 Definitions “...to remove a facility or site safely from service and reduce residual radioactivity to a level that permits (1) Release of the property for unrestricted use and termination of the license; or (2) Release of the property under restricted conditions and termination of the license.” “Major decommissioning activity” is more specifically defined to include “...any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components for shipment containing greater than class C waste...”

Funding for SNF management activities is addressed in a separate regulation, 10 CFR 50.54(bb), but those regulations do not specifically address whether post-operational SNF management can be funded by the NRC. 10 CFR 50.75 Reporting and Recordkeeping for Decommissioning Planning requires plant owners to periodically report the status of its DTF to the NRC and to submit a preliminary decommissioning cost estimate about five years prior to shutdown. A footnote in this regulation makes reference to SNF management costs: “Amounts are based on activities related to the definition of “Decommission” in § 50.2 of this part and do not include the cost of removal and disposal of spent fuel or of nonradioactive structures and materials beyond that necessary to terminate the license.”

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<sup>44</sup> An ISFSI is an independent spent fuel storage installation regulated and licensed by the NRC.

<sup>45</sup> <https://www.nrc.gov/waste/spent-fuel-storage/faqs.html>

[begin confidential] [redacted] [end confidential] LAI has confirmed with the NRC that DTF exemptions are possible and plant owners can request that post-operational decommissioning costs can be funded by the DTF once a deactivation decision is made. If its request is successful, PSEG would avoid post-shutdown SNF management and other decommissioning costs while continuing to bear Allocated Overhead Costs. Assuming PSEG is successful in its request to the NRC, post-operational O&M costs for SNF management and other decommissioning activities at Hope Creek can be considered avoidable.

(d) Spent Nuclear Fuel Disposal Expenses

Under the ZEC Act, certified cost projections must include “spent fuel expenses.” PSEG defined spent fuel expenses as the DOE SNF disposal fee and included it in its certified cost projections. PSEG has not actually incurred or accrued that expense since 2014, as explained in its responses HC-ZECJ-FIN-0006 and 0007: [begin confidential]

[redacted]

[redacted] [end

confidential]

Financial statements must adhere to Generally Accepted Accounting Principles (“GAAP”) that incorporate guidance from the Financial Accounting Standards Board (“FASB”). FASB Statement No. 5, Accounting for Contingencies, directs companies to disclose contingent liabilities, such as future SNF disposal costs, in their financial statements according to three levels of likelihood:

- a. Probable. The future event or events are likely to occur.
- b. Reasonably possible. The chance of the future event or events occurring is more than remote but less than likely.
- c. Remote. The chance of the future event or events occurring is slight.

In general, probable contingent liabilities should be included in the financial statement as an accrual if the amount can be reasonably estimated. Reasonably possible contingent liabilities should be disclosed in the notes to the financial statements. Remote contingent liabilities are not required to be disclosed unless omission would be misleading. PSEG’s financial statements in its 2019 and 2020 Form 10-Ks did not include SNF disposal costs in its financial statements or disclose them in the notes, indicating PSEG believes them to have a remote likelihood. In its Response to Discovery Request: BPU-Cross-0048, PSEG confirmed “For the period covered in those financial statements the fee has not met the accounting thresholds as prescribed by GAAP to be recorded as a liability.”

Consistent with this information, PSEG provided historical spent fuel expenses of [begin confidential] [REDACTED] [end confidential] starting in Energy Year 2014-2015 in Response to Discovery Request: HC-ZECJ-FIN-0006 and in other portions of its application. Response to Discovery Request: HC-ZECJ-FIN-0007 PSEG goes on to explain its treatment of this expense in the future: [begin confidential]

[REDACTED]

[end confidential]

We do not know if or when the DOE will reinstate a SNF disposal fee or what that fee may be. The DOE has adequate funds to cover its initial costs of developing a SNF disposal site for the foreseeable future. The most recent DOE Audit Report on the Nuclear Waste Fund (DOE-OIG-21-02 dated November 2019) indicates that it had total assets of \$43.1 billion as of September 30, 2019. The DOE has not announced its intention to develop another SNF disposal site and is not incurring significant disposal development or administrative costs. We do not expect DOE to require collecting SNF disposal fees from nuclear plant owners for many years. Our opinion is generally consistent with Exelon’s assumption that SNF disposal costs may not occur until 2035, as stated in Note 19 – Commitments and Contingencies, Spent Nuclear Fuel Obligation, to its 2020 Form 10-K financial statements:

Generation currently assumes the DOE will begin accepting SNF in 2035 and uses that date for purposes of estimating the nuclear decommissioning asset retirement obligations. The SNF acceptance date assumption is based on management’s estimates of the amount of time required for DOE to select a site location and develop the necessary infrastructure for long-term SNF storage.

In its 2019 and 2020 Form 10-Ks, PSEG discussed SNF storage and disposal and confirmed its SNF disposal cost has been and is currently zero but has not estimated a date when the DOE will begin accepting SNF. We anticipate DOE will not charge SNF disposal fees until a federal disposal site is identified and licensed, which would be many years in the future given the lack of progress so far. According to page 22 of PSEG’s 2019 Form 10-K and page 20 of PSEG’s 2020 Form 10-K regarding Fuel and Waste Disposal:

The federal government has entered into contracts with the operators of nuclear power plants for transportation and ultimate disposal of spent nuclear fuel. Under the Nuclear Waste Policy Act of 1982 (NWPA), nuclear plant owners are required to contribute to a Nuclear Waste Fund to pay for this service. Since May 2014, the United States Department of Energy (DOE) reduced the nuclear waste fee to zero. No assurances can be given that this fee will not be increased in the future. The NWPA allows spent nuclear fuel generated in any reactor to be stored

in reactor facility storage pools or in Independent Spent Fuel Storage Installations located at reactors or away from reactor sites.

Furthermore, there is no near-term risk that PSEG will not be able to store SNF on site. The NRC issues dry cask certificates of compliance and permits on-site dry storage under the forty-year operating licenses. A dry cask certificate can be renewed if the holder demonstrates that the cask can continue to meet NRC technical requirements for an additional certificate approval period. Storage on an ISFSI can also continue as long as NRC technical requirements and operating conditions are met. Hope Creek, Salem 1, and Salem 2 share an ISFSI with three storage pads licensed by the NRC. According to the PSEG Salem/Hope Creek Generating Station Independent Spent Fuel Storage Installation 10 CFR 72.212 Evaluation Report (rev. 10) of January 12, 2017, Hope Creek began storing SNF in 2006 using NRC-certified dry storage casks.

PSEG's Response to Discovery Request: HC-ZECJ-FIN-0007 claims that the cost of SNF disposal "...was recognized and included in the NY ZEC process as a reasonable risk factor that nuclear generation owners need to ensure they can cover in order to remain in operation economically." As we pointed out in our 2019 ZEC 1 Report, a SNF disposal fee may have been considered in New York's process leading up to the PSC Order Adopting a Clean Energy Standard in Cases 15-E-0302 and 16-E-0270, but the Order of August 1, 2016 itself makes no mention of this fee. The ZEC pricing formula in the NYPSC Order (reproduced below) does not include a SNF disposal fee. The NYPSC based its ZEC calculation on the Social Cost of Carbon with adjustments for (i) the costs already captured by RGGI and (ii) future changes in Zone A energy prices and rest-of-state ("ROS") capacity prices.

$$\boxed{\text{Social Cost of Carbon}} - \boxed{\text{Baseline RGGI Effect}} - \boxed{\text{Amount Zone A Forecast Energy Price and ROS Forecast Capacity Price combined exceeds } \$39/\text{MWh}} = \boxed{\text{ZEC Price}}$$

LAI prepared Discovery Request Staff PS-0001 for PSEG to "...provide documentation that the calculation of NY ZEC values includes the cost of SNF disposal." PSEG responded that [begin confidential]

[end confidential] We agree that the NY PSC considered this and other nuclear cost information, but its Order adopting a Clean Energy Standard does not mention the SNF disposal fee and the approved ZEC pricing formula is purely based on the Social Cost of Carbon adjusted for market revenues.

On pages 8 and 9 of PSEG Witness Cregg's Direct Testimony, he states "In the meantime, we continue to build up spent fuel inventory for each MWh produced, and because we bear the financial obligation of spent fuel disposal, we continue to build up costs related to disposal. It is prudent to assume that DOE will perform its legal obligation, and we will incur those costs." We want to clarify two items. First, Witness Cregg's statement "we continue to build up costs" is inconsistent with PSEG's 10-K financial statements since 2014; no SNF disposal costs have been accrued or disclosed. Second, DOE had been collecting SNF disposal fees based on each nuclear

plant’s generation at that time. We do not know if DOE will “claw back” disposal fees from PSEG for its SNF inventory based on generation in previous years.

To summarize, we question whether PSEG’s SNF disposal costs are true costs if PSEG is neither incurring nor accruing these costs. We also question if SNF disposal costs are avoidable by ceasing operations (as proscribed in the ZEC Act) if they are neither incurred nor accrued. In its Response to Discovery Request: Staff-PS-0011, PSEG estimated its SNF disposal costs at [begin confidential] [REDACTED] [end confidential] for Hope Creek. Removing these costs would improve revenues less costs for Hope Creek by those amounts, a total of [begin confidential] [REDACTED] [end confidential] over the second eligibility period.

Table 9. Impact of Excluding Spent Fuel Costs on Hope Creek Financial Results

[begin confidential]

[REDACTED TABLE CONTENT]

[end confidential]

(e) Cost of Operational Risks

The “cost of operational risks” is defined in Section 3.a of the ZEC Act as “...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 a lower than expected capacity factor...” The ZEC Application for the Second Eligibility Period, section III. Financial - Risks - 18.a, requested applicants to “Provide a detailed explanation, including supporting workbooks, of how the costs of operational risks and market risks were calculated for energy years 2023–2025...”

PSEG did not provide a supporting workbook for the cost of operational risks in its Response to Discovery Request: HC-ZECJ-FIN-0018. PSEG’s explanation referred back to its application for the initial eligibility period: [begin confidential] [REDACTED]

[REDACTED] [end confidential]

PSEG also referred to other responses, i.e., FIN-2,-7,-13,-22, and -25 to support its cost of operational risks. PSEG identified various types of operational risks, e.g., NRC regulatory mandates and equipment failures, and made two claims in FIN-0002-Definitions.

- 1. [begin confidential] [REDACTED]

[redacted] [end confidential] LAI evaluated PJM's 10% energy and capacity adders separately as bases for PSEG's [begin confidential] [redacted] [end confidential] cost of operational risk.

a. 10% Energy Adder: PJM permits energy bids to incorporate a 10% uncertainty factor (OATT, Attachment K, Appendix 6.4.2) regardless of fuel type. While all generators have some uncertainty in their variable costs, gas-fired generators have a specific fuel cost uncertainty that became evident during the January 2014 Polar Vortex incident. FERC's Order in Docket No. ER16-76 of December 11, 2015, explained, "[I]n January 2014, severely cold weather caused natural gas prices to spike due to pipeline deliverability issues and increased demand, driving the costs of producing electricity from certain gas-fired generators to exceed PJM's \$1,000/MWh offer cap for market-based and cost-based sell offers."<sup>46</sup> In the Determination portion of this Order, FERC stated:

We find the inclusion of the 10 percent adder for offers between \$1,000/MWh and \$2,000/MWh just and reasonable as it reflects PJM's current approach to bids for mitigated offers. PJM currently requires generators to have in place a fuel policy that PJM applies automatically whenever that unit is mitigated. As PJM explains, the 10 percent adder is allowed for determining these *ex ante* bids in order to account for uncertainty in the values of the costs utilized in computing those cost-based offers before all costs are known. These mitigated bids are then included in the bid stack to determine the clearing price.

PJM provided a consistent explanation in its May 8, 2017 Compliance Filing in FERC Docket No. ER17-1567:

PJM will increase the fuel price estimate by ten percent as a variance adder to allow for uncertainty. The ten percent fuel cost adder is intended to cover fuel cost variance, transportation cost, and other costs not explicitly modeled, and is necessary because the pricing data PJM receives from the third-party vendor may not be wholly representative of the Market Seller's actual fuel costs. This is particularly true during times of market illiquidity, such as those experienced during the 2014 Polar Vortex, which is precisely when a cost-based offer is likely to exceed \$1,000/MWh. During these times, fuel costs can rise dramatically, for example, as a result of natural gas-fired resources' inability to obtain capacity on natural gas pipelines due to transportation constraints. Therefore, the ten percent fuel cost adder is necessary to account for potential volatility in fuel cost.

Although these FERC dockets address energy bids exceeding \$1,000/MWh (PJM OATT, Attachment K, Appendix 6.4.3), the quotes from FERC's Order and PJM's Compliance Filing highlight fuel cost uncertainty for gas-fired generators. As Hope Creek is a nuclear plant with relatively stable and known operating costs, we question whether PJM's 10% energy price adder supports PSEG's cost of operational risks.

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<sup>46</sup> The Board filed comments in this Docket asserting that PJM did not provide evidence supporting the 10% adder.



LAI prepared Discovery Request Staff-PS-0002 for PSEG to “[p]rovide a detailed explanation, including supporting workbooks, of how the costs of operational risks...were calculated for energy years 2023-2025...” PSEG responded it [begin confidential]

[redacted]

[redacted] [end confidential]

PSEG also provided an Excel workbook attachment, “Calculation of Cost of Operational Risks based on ZECFIN-7” that applies the [begin confidential] [redacted] [end confidential] cost of operational risk value to Hope Creek’s total costs (expenses and Capex) to derive the cost of operational risk in dollar terms. The workbook does no more to explain the derivation of the [begin confidential] [redacted] [end confidential] value of the cost of operational risks.

LAI prepared Discovery Request Staff-PS-003 for PSEG to “...provide documentation that the calculation of NY ZEC values includes the cost of operational risk.” PSEG repeated its explanation that [begin confidential]

[redacted] [end confidential]

We agree that the NY PSC considered this and other nuclear costs in its Order adopting a Clean Energy Standard, but the Order does not mention the cost of operational risk. Moreover, the approved ZEC pricing formula is purely based on the Social Cost of Carbon adjusted for market revenues.

In Response to Discovery Request: Staff-PS-0011, PSEG updated its estimated costs of operational risks at [begin confidential] [redacted] [end confidential] for Hope Creek. Eliminating this cost category would improve revenues less costs for Hope Creek by an average of [begin confidential] [redacted] [end confidential] over the second eligibility period.

Table 10. Impact of Cost of Operational Risks on Hope Creek Financial Results [begin confidential]

[redacted]

[end confidential]



(f) Cost of Market Risks

The “cost of market risks” is defined in Section 3.a of the ZEC Act as “...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.” As with the cost of operational risks, it appears that PSEG and its financial consultants utilize a cost of market risk in its internal planning process to reflect downside risks of replacing energy in the event of a forced outage or that market energy and capacity prices will be lower than projected. PSEG calculates the cost of market risk for its generation portfolio, not for its nuclear power plants or for individual plants.

PSEG’s initial cost of market risks of [begin confidential] ██████████ [end confidential] in the Hope Creek application was based on forward energy prices as of May 29, 2020. PSEG submitted an updated cost of market risk of [begin confidential] ██████████ [end confidential] on page 25 of PSEG Witness Cregg’s Direct Testimony based principally on updated forward energy prices as of September 30, 2020. PSEG explained that higher forward energy prices lower the risk that Hope Creek will clear the BRAs in the second ZEC eligibility period.<sup>47</sup>

PSEG provided confidential descriptions of how it calculates the cost of market risks for each nuclear plant using a risk modeling software package from [begin confidential] ██████████ [end confidential], with which we are familiar. PSEG’s market risks are comprised of two components: (i) forced outage risk where PSEG would have to replace contracted sales with higher-priced spot energy purchases and (ii) price volatility risk where market prices may be lower than projected prices. PSEG utilizes its risk software to assess the market risk of its generation portfolio, taking into account hedges and other PSEG risk mitigation measures as well as near-term market conditions that impact its portfolio.<sup>48</sup>

We note that all merchant generators face such market risks, with appropriate differentiation for volume, location, and other generation-specific issues. Furthermore, PSEG, like virtually all owners of merchant generation assets, constantly seeks to cost-effectively hedge its market risks in PJM. PSEG manages its generation portfolio risk at the [begin confidential] ██████████ [end confidential] confidence level, i.e., there is a [begin confidential] ██████████ [end confidential] chance that the financial downside won’t exceed the forecasted energy prices with the cost of market risk factored in.

PSEG’s 2019 and 2020 Form 10-Ks generally explains how it manages market risk in Item 7A. Quantitative and Qualitative Disclosures about Market Risk. “To reduce price risk caused by market fluctuations, we enter into supply contracts and derivative contracts, including forwards, futures, swaps and options with approved counterparties. These contracts, in conjunction with

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<sup>47</sup> The difference for Hope Creek between the initial and updated costs of market risk is minimal; the differences for Salem 1&2 were more significant.

<sup>48</sup> PSEG attached large amounts of confidential hedge information in its ZEC applications and noted that such hedges are for its generation portfolio and not for the individual nuclear units. LAI did not review this information.

physical sales and other services, help reduce risk and optimize the value of owned electric generation capacity.”

In Response to Discovery Request: HC-ZECJ-FIN-0018, PSEG more specifically explained it [begin confidential] [REDACTED]

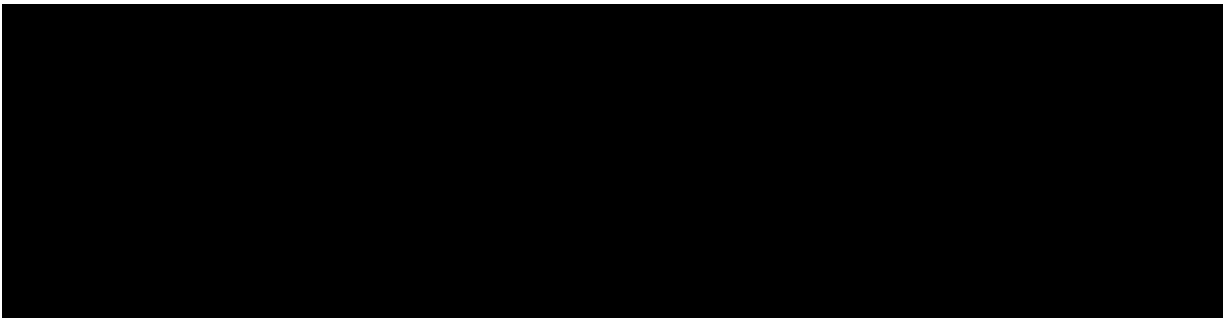
[REDACTED] [end confidential] The Western Hub is the most liquid PJM trading hub. Next, PSEG hedges a minimum of [begin confidential] [REDACTED] [end confidential] of the zonal power basis between the Western Hub and the PECO zone. As the delivery month arrives, PSEG may increase its zonal power basis hedge and achieve a [begin confidential] [REDACTED] [end confidential] zonal power hedge, depending upon commercial opportunities and market liquidity. PSEG’s hedging strategy was confirmed in its January 2021 Investor Update that reported 100% of its nuclear plant output for 2021 was hedged and 60-65% was hedged for 2022. Such hedging minimizes short-term energy price volatility but not long-term energy price volatility.

PJM’s capacity market BRAs have been delayed for the next five Delivery Years beginning with 2022/2023. PSEG identified the resulting uncertainty in capacity prices as the key reason the cost of market risk [begin confidential] [REDACTED] [end confidential]. The cost of market risk for Hope Creek, however, will remain unchanged at [begin confidential] [REDACTED] [end confidential].

While the cost of market risk was incorporated in the certified cost projections, it is not a true cost incurred by PSEG and is not a line item in its published financial statements or disclosed in the notes. While it may be a prudent and useful generation planning and asset management parameter, it is not clear whether the cost of market risks would be avoided by ceasing operations or whether they should be included in the Board’s consideration of ZEC adjustments.

In Response to Discovery Request: Staff-PS-0011, PSEG estimated its costs of market risks at [begin confidential] [REDACTED] [end confidential] for Hope Creek. Eliminating this cost category would improve revenues less costs for Hope Creek by an average of [begin confidential] [REDACTED] [end confidential] over the second eligibility period.

Table 11. Impact of Cost of Market Risks on Hope Creek Financial Results [begin confidential]



[end confidential]

(g) Other Cost Projection Items

Real Estate Taxes – PSEG may continue to incur real estate taxes after retirement but at under [begin confidential] [redacted] [end confidential] million per year they are not significant to our evaluation.

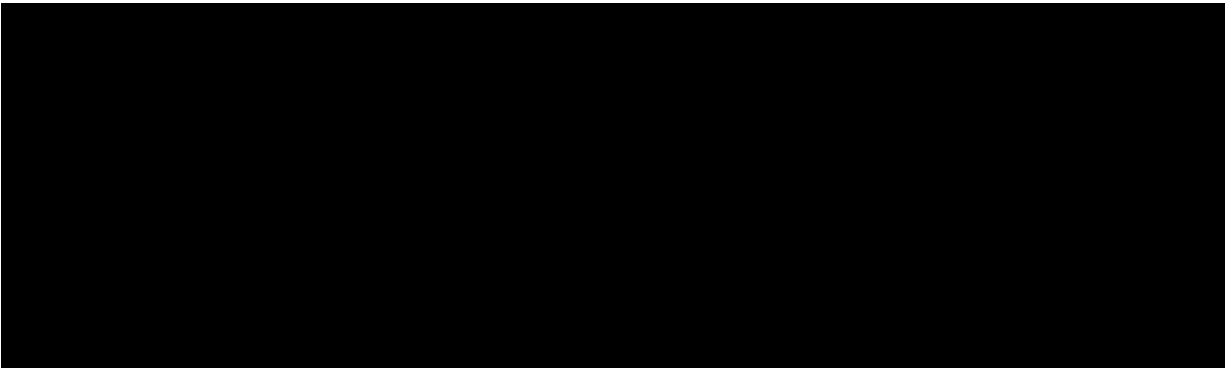
Cost of Working Capital – The largest working capital component is nuclear fuel construction work in progress and in production. If Hope Creek is shut down, PSEG would not incur costs to produce nuclear fuel rods and assemblies, but would have cask fabrication and storage costs. Other working capital components include accounts receivable, materials and supplies inventory, and hedging costs, offset by accounts payable. PSEG would continue to a reduced level of working capital.

(h) Combined Impact of Line Item Adjustments and Exclusions

LAI identified one possible revenue adjustment (higher capacity prices) and three possible exclusions of non-incurred costs (SNF disposal costs, the cost of operational risks, and the cost of market risks). Table 12 presents the combined impacts of these revenue and cost adjustments.

Table 12. Impact of Revenue and Non-Incurred Cost Adjustments on Hope Creek Financial Results

[begin confidential]



[end confidential]

*Requested Subsidies*

PSEG provided annual subsidy amounts required to keep Hope Creek economically viable. We note the revenue and cost adjustments discussed above would significantly reduce PSEG’s requested subsidy amounts. In PSEG ZECJ-FIN-25, PSEG estimated the following subsidies that it would require to keep Hope Creek economically viable.<sup>49</sup> PSEG calculated these subsidies by dividing the results of the certified cost projections, i.e., Total Revenues Less Total Costs, by Hope Creek’s expected generation. We note

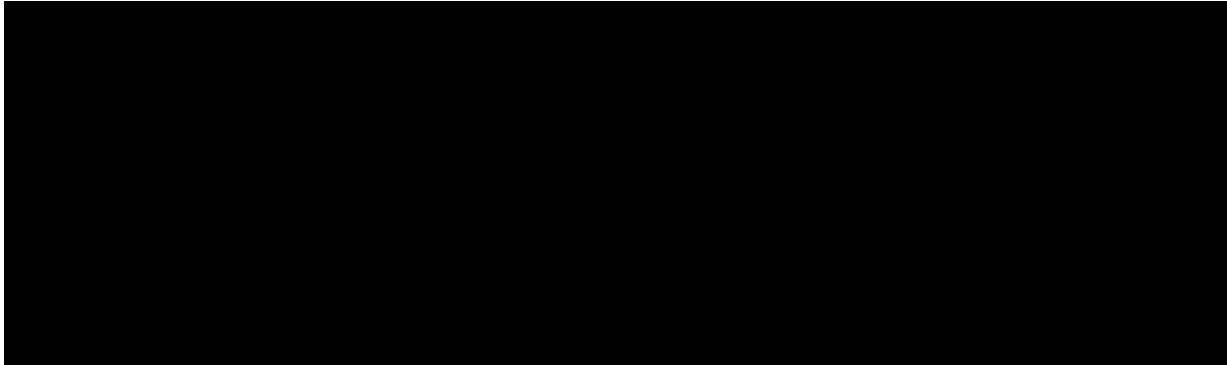
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<sup>49</sup> HC-ZECJ-FIN 0025 25Answer-All7a-CONFIDENTIAL.xlsx. Reproduced as Staff-PS 0010 10-Result-updated-Confidential.xlsx in Energy Years. Updated values were provided in Staff-PS 0011-UPDATE 11-updated-answer-Confidential.xlsx.

that subsidies are substantially lower in the non-refueling outage years than in years with a refueling outage.

Table 13. Annual Hope Creek Subsidies with Revenue and Non-Incurred Cost Adjustments

[begin confidential]



[end confidential]


If PSEG’s cost projections are adjusted by increasing the expected energy and capacity revenues and excluding non-incurred costs, the required subsidy amounts would decrease as shown in Table 13.

*Plant Shutdown*

Section 3.e(3) of the ZEC Act requires the applicant to demonstrate that “... the nuclear power plant will cease operations within three years unless the nuclear power plant experiences a material financial change...”. In the ZEC 2 application, the PSEG Board provided a Written Consent dated September 8, 2020<sup>51</sup> to close the three plants absent a material financial change. The Public Service Enterprise Group Board passed a similar resolution dated September 15, 2020<sup>52</sup> that includes the following language:

[begin confidential]



<sup>50</sup> The combined impact of the revenue adjustment and cost exclusions result in [begin confidential]  [end confidential].

<sup>51</sup> See HC-SSA 0001 Attachment A - 2020.09.08 Nuclear Written Consent ZEC.pdf.

<sup>52</sup> See HC-SSA 0001 Attachment B - 2020.09.15 ZEC Filing Enterprise BOD Resolution.pdf.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [end confidential]

The Board Resolution satisfies the associated ZEC Act requirement. We note that pages 28-29 under Regulatory, Legislative, and Legal Risks of PSEG’s 2019 Form 10-K confirms PSEG’s plan to retire the three plants absent ZEC payments, if there is a material financial change, or if the ZEC program is overturned or materially changed, as quoted below. PSEG’s 2020 Form 10-K, on page 32 under Regulatory, Legislative, and Legal Risks, contains similar language.

In April 2019, PSEG Power’s Salem 1, Salem 2 and Hope Creek nuclear plants were awarded ZECs by the BPU. The BPU’s decision awarding ZECs has been appealed by the Division of Rate Counsel. We cannot predict the outcome of this matter. The nuclear plants are expected to receive ZEC revenue for approximately three years, through May 2022, and will be obligated to maintain operations during that period, subject to exceptions specified in the ZEC legislation. The ZEC legislation requires nuclear plants to reapply for any subsequent three-year periods.

In the event that (i) the ZEC program is overturned or otherwise materially adversely modified through legal process, (ii) the terms and conditions of the subsequent period under the ZEC program, including the amount of ZEC payments that may be awarded, materially differ from those of the current ZEC period, or (iii) any of the Salem 1, Salem 2 and Hope Creek plants is not awarded ZEC payments by the BPU and does not otherwise experience a material financial change, PSEG Power will take all necessary steps to retire all of these plants subsequent to the initial ZEC period at or prior to a scheduled refueling outage.

Boards can change their minds about plant shutdowns and we are not aware of any strict criteria to determine what constitutes the materiality of a financial change or of a modification to the ZEC program. In fact, continuing to receive ZEC payments will not guarantee the continuing operation of these plants according to the following statement on pages 28-29 of PSEG’s 2019 Form 10-K. PSEG’s 2020 Form 10-K contains similar language.

Alternatively, if 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), 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 CWA and related state regulations, or other factors, PSEG Power would still take all necessary steps to retire all of these plants. The costs and accounting charges associated with any such retirement, which may include,

among other things, accelerated depreciation and amortization or impairment charges, potential penalties associated with the early termination of capacity obligations and fuel contracts, accelerated asset retirement costs, severance costs, environmental remediation costs and, in certain circumstances, potential additional funding of the NDT Fund, would be material to both PSEG and PSEG Power.

#### *Independent Market Monitor Analysis*

The PJM IMM addressed the question whether different categories of PJM power plants were economic, i.e., will have revenues covering their avoidable going-forward costs. According to the “2019 State of the Market Report” for PJM, the IMM believes that Hope Creek is economic. The IMM found that the only nuclear plants at risk were single-unit nuclear plants that have higher per-unit operating costs. As explained on page 52 and 3 of the “2019 State of the Market Report”,

Using a forward analysis, a total of 9,543 MW of coal, CT, diesel, and nuclear capacity are at risk of retirement, in addition to the units that are currently planning to retire. The 9,543 MW at risk of retirement include 4,306 MW of coal, 3,103 MW of CT and diesel, and 2,134 MW of nuclear capacity.

The current analysis, based on forward prices for energy and known forward prices for capacity, shows that two plants, Davis Besse and Perry, would not cover their annual avoidable costs. These two plants are single unit sites which have higher operating costs per MWh than multiple unit plants and show an average annual shortfall of \$10.13 per MWh. In March 2018, Davis Besse and Perry requested deactivation in 2021 but reversed the decision based on new subsidies in Ohio. The decisions on how to proceed belong to the owners of those plants. The fact that some plants are uneconomic does not call into question the fundamentals of PJM markets. Many generating plants have retired in PJM since the introduction of markets and many generating plants have been built since the introduction of markets.

Section 7 of the “2019 State of the Market Report” contained a detailed Nuclear Net Revenue Analysis. The IMM forecasted revenues based on forward energy and capacity prices and forecasted costs based on generic nuclear plant data from the Nuclear Energy Institute. The IMM found that the nuclear plant net revenues were high in 2018 due to high gas prices and high LMPs compared to 2017 and 2019. The IMM’s analysis indicates that Hope Creek has an operating surplus as summarized below. The IMM had similar results when expressed on a gross ACR basis.

Table 14. 2019 State of the Market Report – Hope Creek Surplus (Shortfall) (\$/MWh)

2017	2018	2019	2020	2021
\$1.6	\$12.3	\$1.0	\$1.50	\$3.52

#### 4) Other Payments or Credits

Under section 3.e(4) of the ZEC Act, PSEG is required to “certify annually that the facility does not receive any direct or indirect payment or credit...” from other state or federal entities or agencies. We

note that this carries an implicit requirement that PSEG use "...reasonable best efforts to obtain any such payment or credit...that will eliminate the need for the nuclear power plant to retire..." Based on PSEG's Response to Discovery Request: HC-ZECJ-FIN-0015, PSEG certified that, except for payments received under the ZEC Act, it does not receive any direct or indirect payment or credit. Assuming the Board decides to award ZEC payments to Hope Creek for the second eligibility period, LAI anticipates that this criterion will be satisfied in each of the three years by PSEG providing annual certifications that they are not receiving any other subsidies.

5) Application Fee

LAI notes that the cover letter for the Hope Creek application states that the application was accompanied by a fee of \$250,000 as required by the Board.