In the Matter of the Implementation of L. 2018, C. 16 Regarding the Establishment of a Zero Emission Certificate Program for Eligible Nuclear 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

Superior Court of New Jersey
Appellate Division

Appellate Division
Docket No. A-003939-18
Civil Action

On Appeal from the Order of the New Jersey Board of Public Utilities in Docket Nos. EO18080899, EO18121338, EO18121339, EO18121337

Brief of Amicus Curiae, Clean Air Task Force

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Clean Air Task Force ("CATF") submits this brief as amicus curiae in support of neither party.

INTEREST OF AMICUS CURIAE

CATF is a nonprofit, nonpartisan environmental organization dedicated to finding and advocating for technical, legal, and policy solutions to air quality and climate change problems. CATF's mission is to advance solutions necessary to attain a zero-emissions planet, so that the energy needs of all people are met efficiently without damaging the atmosphere.

CATF has over 20 years of experience in the technical, policy, and legal issues related to air quality and climate change emissions from the electric power industry. CATF has published a suite of studies modeling the impacts on public health of air emissions from fossil fuel-fired power plants, among them an online interactive power plant air pollution and human health impacts map, prepared using U.S. Environmental Protection Agency information and models, and available at: www.catf.us/educational/coal-plant-pollution/. CATF also brought its deep expertise in electricity sector functioning and the air quality—public health linkage to a recently completed study analyzing the impacts on air quality and human health of nuclear plant closures in Illinois, available at:

www.catf.us/rsource/retirement-of-nuclear-power-plants-in-illinois/.

CATF's attorneys since 1997 have represented nonprofit clients in federal district and appellate courts in cases challenging rules under Clean Air Act sections 110(a)(2)(D and 126, known as the "good neighbor provisions," 42 U.S.C. §§ 7410(a)(2)(D), 7426. These cases, including cases in which the State of New Jersey is a party, involve attempts to reduce or eliminate the interstate transport of air pollutants that make it difficult for downwind states like New Jersey, to attain or maintain the National Ambient Air Quality Standards ("NAAQS") for various pollutants. *See, e.g., Maryland v. EPA*, D.C. Cir. No. 18-1285 (oral argument held January 16, 2020) (challenging an EPA decision to deny Clean Air Act section 126 petitions filed by New Jersey's neighbors, Maryland and Delaware, arguing that power plant air pollution from states to the west and south upwind of (and blowing into) Maryland, Delaware, and New Jersey keeps those states' air impermissibly dirty). (CATFa051).[1]

CATF provides its expertise to state legislatures considering measures aimed at achieving a 100 percent carbon-

[1] "CATFa" refers to the Appendix submitted by *amicus curiae* CATF herewith.

free econonomy, including having testified before the New Jersey Legislature as it considered how New Jersey nuclear plants help the state avoid carbon dioxide and other air emissions. *See* Testimony of Armond Cohen, ESQ., CATF Executive Director, before the Senate Environment and Energy Committee and the Assembly Telecommunications and Utilities Committee, Regarding New Jersey's Nuclear Power Plants (Dec. 4, 2017), available at: www.catf.us/resource/testimony-regarding-new-jerseys-nuclear-power-plants/.

PRELIMINARY STATEMENT

CATF submits this brief as *amicus curiae* to assist the Court's consideration of an issue of public importance, namely the contribution of the Salem I, Salem II, and Hope Creek nuclear plants ("the nuclear plants") to New Jersey's air quality and climate goals.

While CATF does not express an opinion on the financial questions related to the potential for the retirement of the nuclear plants, CATF does offer its experience and expertise to provide a broader context for the evaluation of the nuclear plants' value to the state and the region. CATF focuses on the interconnected nature of the electric generating system in the United States, the public health and environmental harms caused by burning coal and other fossil fuels to generate electricity,

and the degree to which those harms are experienced in downwind states, like New Jersey.

It is beyond dispute that the nuclear plants make a material and significant contribution to New Jersey's air quality and climate emissions, and impact the state's ability to comply with national air quality standards. For example, New Jersey counties in the Philadelphia and New York City metropolitan areas have, for many years, struggled to attain and maintain the national ozone standards. If nuclear plants close anywhere in the eastern half of the United States, this deterioration will be exacerbated because the energy they now generate will be replaced in the near term with fossil fuel-fired generating resources. That will make it yet more difficult for New Jersey to attain and maintain the national ozone standards within its own borders, as New Jersey already suffers from pollution transport from upwind. Likewise, nuclear plant retirements will make it more difficult for New Jersey to satisfy its own air quality obligations to its neighbor states, which receive air pollution transported from sources in New Jersey.

Rate Counsel's brief pays little or no attention to these far-reaching repercussions. Rather, in seeking a blanket reversal of the Board's decision, Rate Counsel views the extent of such benefits through an extremely narrow, even parochial,

lens. While the New Jersey Board of Public Utilities (the "Board") decision recognizes the greenhouse gas and improved air quality benefits of continued operation of the nuclear plants, this Court should be mindful of the broader implications to persons living and breathing in and beyond the geographical limits of New Jersey, that could result from reversing the Board's decision.

PROCEDURAL HISTORY AND STATEMENT OF FACTS

The New Jersey legislature adopted the Zero Emissions Credit ("ZEC") program to address global climate pollution, to improve air quality, and to assist in the state's goal of achieving 100 percent clean electricity by 2050. N.J.S.A. 48:3-87.3(a). The statute recognizes the importance of zero-emitting nuclear energy sources in meeting those goals. The certificate program is expressly aimed at avoiding "a substantial increase in emissions of several serious pollutants, and [their] associated adverse public health and environmental impacts," should existing nuclear plants be taken prematurely out of service through retirement. The legislature further recognized at the time the ZEC program was established that about 40 percent of New Jersey's energy demand is met by zero-emitting existing nuclear generation. N.J.S.A. 48.3-87.3(a)(7).

Among the requirements to receive credits under the ZEC program, a nuclear plant must demonstrate "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 New Jersey, and if the nuclear plant were to be retired, that retirement would significantly and negatively impact New Jersey's ability to comply with State air emissions reduction requirements[.]" N.J.S.A. 48:3-87.5(e)(2).

On April 18, 2019, the Board awarded ZECs to the nuclear plants. Various parties now challenge the Board's decision, questioning the Board's determination that the plants satisfied the statutory eligibility requirements to receive ZECs, and as a secondary matter, whether the statutory $0.004/kilowatt-hour ZEC charge can and must be adjusted to satisfy a directive that rates be just and reasonable found in another section of the New Jersey laws.

The record in this case contains solid evidence of the nuclear plants' value to air quality and climate pollution reduction in New Jersey. That evidence is further supported by a full understanding of the nuclear plants' role, in and beyond New Jersey, in the interconnected electricity system. That perspective can assist this Court, should it reach questions

about the value and import of the nuclear plants to New Jersey's air quality requirements and climate pollution goals.

ARGUMENT

I. New Jersey Nuclear Plants Contribute to Cleaner Air[2]

To be eligible for the ZEC program, a nuclear plant must satisfy three requirements relating to environmental benefits: (1) a significant contribution to improvement of air quality; (2) minimization of emissions; and (3) that its retirement would have a significant negative impact on New Jersey's ability to comply with emissions reduction requirements. N.J.S.A. 48:3-87.5(e)(2). Due to the interconnected nature of the electricity grid and the local, regional, and global air pollution avoided by continued operation of the nuclear plants, the plants at issue in this case satisfy all three of these criteria. Additionally, if the Court reaches the question of whether the ZEC rate is just and reasonable, these factors should be considered in concluding that it is.

[2] Our colleagues at the Institute for Policy Integrity will offer the court an amicus curiae brief focused on the climate change pollution implications of premature closure of the nuclear plants, which CATF's brief does not address.

1. <u>Premature retirement of the nuclear plants would increase air pollution emissions in New Jersey.</u>

The first environmental criterion in N.J.S.A. 48.3-87.5(e)(2) requires an eligible plant to demonstrate 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." The record in this case makes clear that New Jersey Department of Environmental Protection ("DEP") has taken the position that should the nuclear plants be shuttered, "replacement generation would come from existing fossil-fuel fired facilities" and that this would result in increases not only in carbon dioxide but also in "criteria pollution (including regional haze, [nitrogen oxides], [sulfur dioxide], and particulates) and hazardous air pollutant emissions." New Jersey DEP, Memorandum re: NJDEP Review of PSEG's Zero Emission Credit Applications, April 4, 2019. (Aa715).[3] The record shows that these emissions increases would be significant. PA Consulting, *The Impact of Nuclear Generation Retirements On Emissions and Fuel Diversity in New Jersey*, SI-ZECJ-ENV-0001-0068, App. to Br. Resp. Exelon

[3] "Aa" refers to Appellant New Jersey Rate Counsel's Public Appendix; "EXa" refers to Respondent Exelon's Public Appendix; "RCb" refers to Rate Counsel's Opening Brief.

Generation Company, LLC, Non-Conf. Vol. 1 (EXa48) ("PA Report") at (EXa56) (Fig. 1-2), (EXa57) (Fig. 1-3) (showing, in New Jersey, ten percent increases in nitrogen oxides, mercury, and fine particulate emissions if all three plants retire, and three percent increases in nitrogen oxides and fine particulates if only one plant retires). Premature retirement of the nuclear plants, then, would significantly increase in-state emissions. Regional air pollution emissions also will significantly increase, due to the interconnected nature of the U.S. electricity system, additionally adversely affecting New Jersey residents, as described *infra*.

2. The interconnected nature of the U.S. electricity system means that premature retirement of the nuclear plants will cause significant regional power production shifts.

The U.S. electricity system includes four elements: (1) generating units, connected to one another by a network of (2) transmission lines, from which (3) distribution lines carry electricity to customers to serve (4) demand (or "load"). Additionally, the continental U.S. system is divided into three regional grids: the Western Interconnect, the Eastern Interconnect, and the Electric Reliability Council of Texas. Massachusetts Institute of Technology, *The Future of the Electric Grid*, 3 & Fig. 1.1 (2011) ("MIT Grid Future")

(CATFa004),[4] available at: mitei.mit.edu/publications/reports-studies/future-electric-grid. Within each interconnect, federally regulated entities called Independent System Operators or Regional Transmission Organizations ("RTOs") work to balance the supply of generated electricity with the demand for it. *Id.* at 4 (CATFa005).

State boundaries do not affect this flow of electricity. For example, as the U.S. Supreme Court long-ago recognized, "[i]f someone in Atlanta on the Georgia system turns on a light, every generator in Florida's system almost instantly is caused to produce some quantity of additional electric energy which serves to maintain the balance [between supply and demand for electricity] in the interconnected system ...." *FPC v. Florida Power & Light Co.*, 404 U.S. 453, 460 (1972).

The same is true in New Jersey. New Jersey sits within the Pennsylvania-Jersey-Maryland Power Pool ("PJM"), which in turn, sits within the Eastern Interconnect. As its name suggests, the Eastern Interconnect is a fundamentally interdependent system stretching across the eastern half of the country (including some parts of Canada), so that demand in one state can be met by generation several states over. In addition to New Jersey,

[4] "CATFa" refers to the Appendix to this Brief.

Pennsylvania, and Maryland, the PJM also includes all or portions of the states of Delaware, West Virginia, Ohio, Indiana, Kentucky, Virginia, North Carolina, Wisconsin, Illinois, Michigan, and the District of Columbia. *Territory Served*, https://www.pjm.com/about-pjm/who-we-are/territory-served.aspx (last visited Jan. 24, 2020) (CATFa021). So, taking a plant off-line in New Jersey (removing supply) will mean that existing generating resources will be called on, in areas both within New Jersey and beyond it, to satisfy the demand for electricity in New Jersey.

In the PJM regional market, as in other competitive wholesale markets, generators bid in their offers to sell electricity. Generally, these bids are called on in ascending order by price, so that the lowest cost generator is called on to supply electricity first, a process called 'constrained least-cost' dispatch.[5] Within that system, "[s]ome baseload generators, such as nuclear plants, are costly to shut down or bring back on-line and will offer their energy at a price of zero [or even a negative price] to ensure they are always

[5] Constraints that can affect this order include transmission limits and state environmental requirements.

dispatched."[6] MIT Grid Future at 5 (CATFa006). Additionally, because nuclear plants are rarely shut down, they are constantly called on to serve load, even at that zero or negative bid price.

This means that removing even one nuclear plant from the generation mix will *always* cause changes in the rest of the interconnected system. Other generation sources that are more easily, and cheaply, ramped down and back up again, like coal- or natural gas-fired power plants, will be called on to replace the missing generation when a nuclear plant is taken out of service. Retiring a generator in New Jersey will mean New Jersey's demand is supplied first by under-utilized generators in PJM, not located only in New Jersey, but also in Pennsylvania, Maryland, Delaware, and, further away, West Virginia, Ohio, Kentucky, Virginia–even potentially from as far away as portions of Indiana, Wisconsin, Michigan, and Illinois.

Thus, if the nuclear plants are removed from the PJM generation mix, not only will New Jersey coal- and natural gas-fired power plants run more, but coal- and natural gas-fired

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[6] In this system all generators called on to satisfy demand are paid the "clearing price" – that is, the bid price of the last generator that is called on – regardless of the specific generator's bid. MIT Grid Future at 5. (CATFa006).

power plants throughout PJM will be called on more often (until new zero-emitting generation can be permitted, constructed and brought into service). Any shift in generation from nuclear power to fossil fuel-generated electricity, as the New Jersey DEP staff has noted, will result in emissions increases not only of carbon dioxide, but of smog-forming nitrogen oxides and volatile organic compounds, air toxics, sulfur dioxide, and fine particulates. (Aa715, see also EXa56-EXa57). Those increases will occur not only in New Jersey, but in upwind states as well. *Id.*

3. **The regional power production shifts caused by nuclear plant retirements will adversely affect New Jersey air quality.**

The second environmental criterion in N.J.S.A. 48.3-87.5(e)(2) requires an eligible plant to demonstrate that it "minimizes harmful emissions that adversely affect the citizens of the State." This evaluation requires a regional perspective, even as it focuses on costs and New Jersey Rate Counsel's claims, (RCb54), emissions from entities outside New Jersey must also be considered.

In the event of nuclear plant retirement, the plants called on for replacement generation will be located in states upwind of New Jersey as well as in New Jersey. As a result, the amount of additional conventional air pollution impacting New Jersey will be higher than if the replacement power were supplied only

by New Jersey plants. That is because the fuel mix of plants upwind of New Jersey includes underutilized coal-fired generation, and those plants are among the largest emitters of nitrogen oxides, a pollutant that is a precursor to ground-level ozone smog. *See Air Emissions and Electricity Generation at U.S. Power Plants*, GAO-12-545R (April 2012) at 20-23 (CATFa023-026), available at: www.gao.gov/assets/600/590188.pdf.

Ground-level ozone smog is formed when nitrogen oxides interact and react with volatile organic compounds in the presence of sunlight. Smog formation commonly occurs many tens to hundreds of miles downwind of the source of the precursor pollution. *See Cross-State Air Pollution Rule for the 2008 Ozone NAAQS*, 81 Fed. Reg. 74,504, 74,585 (Oct. 26, 2016). Exposure to ozone smog at any concentration, but particularly at concentrations above the national standards,[7] severely harms public health and ecosystems. Ozone exposure impairs lung function, aggravates respiratory illnesses, increases cardiovascular risk (including the risk of heart attacks), and is linked to premature deaths. The most vulnerable persons are

[7] National ambient air quality standards for ozone and other pollutants are set at levels determined to be "requisite to protect public health with an adequate margin of safety, and to protect public welfare from known or anticipated adverse effects." 42 U.S.C. § 7409(b).

most affected, including children, the elderly, and those with pre-existing respiratory illnesses like asthma. Ozone pollution also disproportionately harms those who are most active outdoors (for example, outdoor workers and children playing). *National Ambient Air Quality Standard for Ozone*, 80 Fed. Reg. 65,292 65,302-311 (Oct. 26, 2015).

Ozone smog is a significant problem in New Jersey. Every county in New Jersey is currently in nonattainment of the federal ozone smog standards. Twelve counties in northern New Jersey are part of the New York-New Jersey-Connecticut Metropolitan Area ("NYMA") ozone nonattainment region. 40 C.F.R. § 81.331. NYMA is currently in nonattainment for both the 2008 ozone standard, set at 75 parts per billion, and the 2015 ozone standard of 70 parts per billion. *Id.* The remaining nine New Jersey counties are part of the Philadelphia-Wilmington-Atlantic City (Philadelphia) Area, which also is not attaining either the 2008 or the 2015 ozone standard. *Id.*

Non-attainment of the national ozone standards has economic consequences for New Jersey. Among them are the costs of requirements to further control existing in-state sources of ozone precursor emissions, and the continuation of vehicle inspection and maintenance programs. Additionally, new industrial sources wishing to locate in New Jersey are subject to more stringent air quality permitting requirements as a

result of continued ozone nonattainment status in the NYMA and the Philadelphia Area. *See generally* 42 U.S.C. § 7511a (describing program requirements for ozone nonattainment states).

4. Retirement of the nuclear plants will lead to further significant negative impacts on New Jersey's ability to comply with emissions reduction requirements.

According to a federal district court complaint filed by the state of New York in 2019 under Clean Air Act section 126, although New Jersey and New York have taken significant steps to reduce ozone precursor emissions from sources within their states, ozone nonattainment in the NYMA remains a problem due to persistent emissions of nitrogen oxides from major stationary sources in upwind states. Complaint, *New York v. Wheeler*, S.D.N.Y. Civ. No. 1:19-cv-3287 (April 12, 2019) 5-6 & Exh. 2 Appendix B. (CATFa031-032, CATFa039-050). Those sources include coal- and gas-fired power plants in Maryland, Pennsylvania, Ohio, Illinois, Kentucky, Michigan, Virginia, West Virginia, and Michigan; sources that, should the nuclear plants retire, would operate more to satisfy demand for power in New Jersey.

New Jersey also has argued in the U.S. Court of Appeals for the District of Columbia Circuit that upwind coal-fired power plants are a significant cause of the state's difficulty attaining the ozone standards in both the NYMA and in the Philadelphia Area, and that continued inability to meet the

standards in those areas "expose[s] the public to unhealthy levels of ozone pollution for longer periods of time." Brief of Petitioner-Intervenors New York, New Jersey, and City of New York, *Maryland v. EPA,* D.C. Cir. No. 18-1285 (April 12, 2019) at 18, 28–29 (CATFa051); *see also* Appendix to Motion to Intervene of the States of New York, New Jersey, and the City of New York, *Maryland v. EPA,* D.C. Cir. No. 18-1285, Declaration of Sharon C. Davis [New Jersey DEP] at ¶¶ 12, 16 (Dec. 4, 2018) (CATFa008) (describing New Jersey's efforts to control ozone precursor emissions from New Jersey sources, and the continued problem of transported air pollution from upwind coal-fired power plants in Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia, which keep New Jersey in ozone nonattainment).

The coal-fired power plants named in these cases are all within the PJM region, and therefore will be among those called on to fill the electricity supply-demand gap left should one or more of the nuclear plants prematurely retire. Because, as discussed *supra*, and described in the record at EXa55-EXa57, EXa80-EXa85, removing a zero-emitting nuclear plant from the generation mix will require replacement power from sources that ramp up and down easily (and therefore can easily be made available to fill the generation gap created by a nuclear plant's removal from the mix), gas- and coal-fired power plants in the PJM states will be called on to run more, thereby

producing more of the nitrogen oxides that already cause and contribute to high ozone in New Jersey. Ozone levels in New Jersey, therefore can be expected to increase (if one or more of the nuclear plants retires) not only due to increased power production from fossil fuel-fired power plants located in New Jersey itself, but also due to increased fossil-fueled power production in upwind states in PJM.

Finally, in addition to the state's own ozone nonattainment problem, fossil fuel-fired power plants in New Jersey also contribute significantly to nonattainment of national ozone standards in New York and Connecticut counties which are downwind of New Jersey. 81 Fed. Reg. 74,504 at 74,538-539 (Tables V.E-2, V.E-3). New Jersey therefore is both the recipient and the source of transported ozone and ozone precursor emissions (nitrogen oxides in particular). Additional emissions of nitrogen oxides from fossil fuel-fired power plants in New Jersey, which would occur should one or more of the nuclear plants go offline, (EXa56-EXa57), would therefore impair New Jersey's ability to satisfy its own good neighbor obligations owed to states downwind of it, like New York, and Connecticut.

CONCLUSION

CATF offers these perspectives on the important air quality values associated with the continued operation of the nuclear plants in order to provide the Court with additional context as to their importance to regional and New Jersey air quality.

RESPECTFULLY SUBMITTED,

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