Mr. David A. Tancabel, Director
Mr. Bob Sadzinski, Manager
Power Plant Research Program
Department of Natural Resources
580 Taylor Ave., B-3
Annapolis, Maryland 21401
September 7, 2018

RE: Comments of Exelon Generation in Response to the "*Strength and Weakness Analysis of Implementing Zero Emission Credits or Procurement Support for Nuclear Power*" Prepared by the Maryland Power Plant Research Program—August 23, 2018

Dear Mr. Tancabel and Mr. Sadzinski:

Exelon Generation Company, LLC ("Exelon Generation") appreciates the opportunity to submit the attached follow-up items and comments to the RPS Study work group meeting that took place on August 29, 2018 under the direction of the Maryland Power Plant Research Program ("PPRP").

Background and Introduction

As you know, Exelon Generation is one of the largest competitive power generators in the country, with over 35,500 MW of nuclear, natural gas, solar, wind, and hydroelectric generation. Exelon owns and operates 23 of the nation's 99 nuclear reactors, making us the nation's leader in nuclear generation. Our fleet has the lowest CO_2 emissions rate among the top 20 privately-owned power producers in the United States.

Here in Maryland, Exelon Generation operates, and with Électricité de France owns, the state's only nuclear power plant, Calvert Cliffs Nuclear Power Plant ("CCNPP"). The CCNPP reliably provides 44 percent of the electricity generated in Maryland, and 84 percent of the total carbon-free electricity generated in the state. CCNPP also employs 900 workers and pays $22 million annually in state and local taxes. Without CCNPP, Maryland would realize more than five million tons of additional carbon emissions per year or the equivalent of adding over one million cars to Maryland highways. We are proud to say that CCNPP consistently operates through extreme cold and heat, and it has a proven track record of reliability that is unmatched by any other source of power generation in this state.

First, we are submitting comments, in the form of a redlined document, on the draft "Strength and Weakness Analysis of Implementing Zero Emission Credits or Procurement Support for Nuclear Power" ("SWOT Analysis") prepared by the Maryland PPRP. We hope you will find these recommendations useful in guiding your analysis for the interim RPS report due on December 1 of this year.

Second, we are submitting herein for your consideration, additional information to supplement the record surrounding some of the comments and concerns that were expressed during the meeting by other work group members.

Why Consider Nuclear Power in the PPRP RPS Study

Reliable, clean and affordable electricity is vital to Maryland's economic growth, jobs and the overall interests of its citizens. To this end, Maryland has established itself as a national leader in preserving a

cleaner and healthier future for its citizens by establishing a state-wide goal of reducing greenhouse gas ("GHG") emissions. This theme was one of the driving forces behind the passage of MD Chapter 393 – *AN ACT concerning Renewable Energy Portfolio Standard* under the leadership of Vice Chairperson Jamison. MD 393 requested a broad review of the affects the Maryland RPS has on the state's ability to achieve its energy policy goals, including the aspirational reduction of GHG emissions by 80 percent from 2006 levels by 2050. MD 393 instructs that the study include "the availability of all clean energy sources" and "the role of in-state clean energy in achieving greenhouse gas emission reductions and promoting local jobs and economic activity in the states." Therefore, consideration of CCNPP and the benefits of nuclear generation squarely fit within the scope of the study.

Creating a Level Playing Field for All Clean Energy Sources

At present, Maryland is deploying and utilizing several generation resources that exemplify this state's dedication to a cleaner energy future. This study is a key example of the state's commitment to ensuring that its energy policies are functioning efficiently to achieve Maryland's commendable GHG reduction goals. Exelon continues to applaud these ongoing efforts. As we look to the next iteration of clean energy policies that are likely to be considered and adopted in the state of Maryland—many of which are being thoroughly explored by this work group—it is important that the state not take for granted the critical value that all of its clean energy resources play in helping the state to achieve its GHG goals. For example, the loss of the output of CCNPP would reverse the benefits of all the renewable generation installed over the past 25 years in Maryland. In addition to wiping out all this environmental progress in Maryland, the loss of CCNPP would represent a significant setback to one of the goals of Maryland's RPS, to reduce GHG emissions.

To amplify this point, we want to highlight a few findings from a report released earlier this week by MIT's Energy Initiative entitled "The Future of Nuclear Energy in a Carbon-Constrained World." This assessment emphasizes the part nuclear energy plays in providing a large share of low-carbon generation throughout the nation, while also ensuring affordable electricity to customers. The study underscores the point that nuclear power keeps electricity prices low, particularly in places like Maryland, where policymakers are electing to place constraints on carbon emissions. This study urges lawmakers looking to institute decarbonization polices to create a level playing field for clean technologies in energy markets. Their recommendations include state programs where the non-emitting attributes of nuclear are valued with Zero-Emissions Credit (ZEC) programs.

As Maryland continues to review their clean energy policies, the existing nuclear generation in the state is a necessary part of, and bridge toward, a 100 percent clean energy future. Achieving such a goal will only be possible if the state begins equitably valuing the clean energy attributes of all zero carbon emitting resources. As Ryan Fitzpatrick of the Clean Energy Program at Third Way explains in a recently penned article emphasizing that nuclear closures are undoing years' worth of climate progress. "At the end of the day, two things really matter in the fight against climate change: growing our total zero-carbon energy production so we can shift away from fossil fuels and doing it quickly. If we allow today's zero-carbon nuclear power to disappear from the grid, much of the growth in renewable power that we're working so hard to accelerate will be wasted, and precious years will be lost in the process. State and federal policy can promote new clean energy *and* support the clean generation we already have. In

fact, if we want to get anywhere close to our climate goals, our policies absolutely *must* take both into account."[1]

Nuclear' s direct impact on Maryland's GHG Reduction Goals

Last month, Maryland Department of the Environment ("MDE") provided to the State's Climate Change Commission ("Commission") new modeling regarding the State's Greenhouse Gas Reduction Act ("GGRA"). In 2009, Maryland adopted this Act requiring the State to reduce Statewide GHG emissions 25 percent from its 2006 levels by 2020. The Act also directed MDE to draft a report by 2020, stating policy recommendations that could help the state reduce its GHG emissions to minimize the impacts of climate change. This amounts to an aspirational goal of an 80 percent reduction from 2006 levels by 2050. Further modifications were made to the GGRA in 2016 to further extend the goal to a 40 percent reduction by 2030, requiring long-term cuts in pollution and positioning Maryland just behind California and New York for the most-aggressive GHG reduction goals in the country.

The original modeling done for the report reflected a baseline reference case calculating what would happen if the state only maintained its current environmental policies. The emissions reduction curve in this reference case showed that Maryland is nearly on target to meet its 25 percent reduction goal by 2020, but then the reduction curve hits a plateau through the mid-2020's. In the mid-2030s the curve shifts, showing that the state would begin increasing their emissions. One of the reasons this flip occurs in the mid-2030's is because CCNPP's two operating licenses expire in 2034 and 2036. The Commission decided to attempt a second look at a reference case, if CCNPP were to be relicensed for an additional 20-year period. By keeping CCNPP operational, the state continues to keep about five million metric tons of carbon out of the environment every year. And while the state's GHG reduction curve still retreats in the mid-2030s it does so by noticeably less with CCNPP remaining operational. This new reference case being examined by the Commission clearly shows the significant benefit the in-state presence of CCNPP provides to Maryland's effort to meet its GHG reduction goals.

Maximizing the Value of the State's Investments in Renewables

A question was posed during the workgroup meeting about what it would take to replace the generation produced by CCNPP. The fact is, the number of years it would take to build sufficient renewables to replace the power from a nuclear plant is measured in decades, not years, even at the greatly accelerated rates of renewable energy deployment. Also of concern, when a nuclear plant ceases to operate, its zero-carbon energy is replaced, often in large part, by increased deployment of fossil-fired generation: natural gas and coal. Maryland needs to preserve and value the benefits of Maryland's carbon-free nuclear generation in order to achieve the state's GHG reduction goals. To put this in perspective consider these recent reports:

- In Pennsylvania and Ohio, over 5 GW of nuclear plants have announced they will prematurely retire by 2022. Some parties recommend replacing lost output from these zero carbon resources with additional renewable energy. The Brattle Group[2] looked at the ability to replace the lost output with renewables and found replacing the lost output from nuclear retirements with renewables would take years at current development rates. Even if PJM

[1] Fitzpatrick, Ryan. "Nuclear Closures Undo Years' Worth of Climate Progress – Third Way." *Third Way*, 10 Apr. 2018, www.thirdway.org/memo/nuclear-closures-undo-years-worth-of-climate-progress.
[2] Brattle Group, "Impacts of Announced Nuclear Retirements in Ohio and Pennsylvania," Dean Murphy and Mark Berkman, April 2018, http://files.brattle.com/files/13725_nuclear_closure_impacts_-_oh_pa_-_apr2018.pdf

renewable growth rates doubled, it would take PJM until 2034, over a decade, to get back to the same levels of non-emitting generation, and emissions will have been up to 21 million metric tons higher annually in the intervening years.

- ScottMadden Management Consultants in April put it this way: "Rapid and Deep Carbon Reductions Require Nuclear Assets: Investments in renewables have made a significant contribution to emission-free electricity generation. For those concerned with climate change, this represents a meaningful step in the right direction. The early retirement of "at-risk" nuclear, however, puts the United States in danger of "giving back" an amount equivalent to two-thirds of the overall carbon-free generation supplied from wind and solar. In states with these nuclear assets, the loss represents a significantly larger impact . . . However, a glimmer of hope emerges as states, such as New York and Illinois, are developing policies to value the carbon-free generation provided by nuclear plants."[3]

These two reports clearly demonstrate that nuclear closures cause back-sliding on GHG reductions. Nuclear is a bridging generation source, loss of nuclear would wipe out years of investment in renewables and energy efficiency. This would be a significant step backwards in efforts by Maryland to decarbonize its economy.

Activity on the Federal Level

The recent June 29, 2018, Order from the Federal Energy Regulatory Commission ("Order"), and associated regulatory proceedings, present potential new opportunities for Maryland to further take charge of its clean energy future. In the Order FERC concludes that PJM must reform its capacity market structure to better accommodate the policy decisions of the states. The Order includes a proposal, commonly referred to as the Resource Specific Fixed Resource Requirement (RS-FRR), which would change the PJM market structure to allow states to procure capacity and clean energy directly on behalf of their residents. If properly implemented, the RS-FRR will work alongside of the PJM capacity market to accommodate state clean energy policy decisions, preserving the right of states to express a preference for reliance on clean energy resources, while also protecting the significant benefits of regional markets. Although crucial implementation details still need to be worked out, there is an opportunity in the regulatory proceedings to seek implementation of FERC's proposal in a manner that will accommodate Maryland's clean energy public policy decisions.

Nuclear Generation and its Record of Safety

Finally, we want to briefly address a few comments about the safety of nuclear. Nuclear power plants are constructed with multiple safety systems and backup power supplies, ensuring that safety systems are always available, if needed. America's nuclear energy plants are designed and built to safely withstand a wide variety of natural and other severe events, a recent example being the ability of South Texas Project nuclear plant near Houston, Texas to continue operating during and after Hurricane Harvey in 2017. Nuclear generation is resilient and immune to fuel delivery infrastructure interruptions, a known risk in Eastern PJM.[4] [5] Data compiled by the U.S. Bureau of Labor Statistics shows that it is safer to work at a nuclear power plant than in the manufacturing sector, leisure and hospitality

[3] ScottMadden "While You Were Sleeping: The Unnoticed Loss of Carbon-free Generation in the United States" (April 2018)
[4] Paul Stockton. Fuel Resilience for the Bulk Power System: Threat-Based Modeling and Analysis. SonEcon (5/8/2018) – natural gas dependence
[5] Lawrence Makovich and James Richards. Ensuring Resilient and Efficient Electricity Generation. IHS Markit. (Sept. 2017)

industries, and financial sectors.[6] In Maryland, CCNPP is staffed by highly trained, federally licensed operators with a decades-long history of safe operations in the United States. At Exelon, our employees are each personally committed to safety, and we are continually working to implement lessons learned from our operating experience to operate safe nuclear energy facilities.

For further information about safety, we recommend this work group consider the information about nuclear safety found in the Nuclear Energy Institute's webpage which can be found at: https://www.nei.org/fundamentals/safety

Conclusion

We again want to thank the Maryland PPRP for their execution of the RPS Study and the facilitation of these work group meetings and the SWOT Analyses that have been developed. We recognize that we have tried to cover a lot of material in these comments, touching on various topics involving nuclear—and this document is by no means an exhaustive compilation of the resources we have to offer. If we could provide any additional resources or materials, please let us know. We would also be able to arrange for a PPRP visit of CCNPP if that would be helpful in providing context for the report. We stand ready to assist the PPRP in any manner that would facilitate the issuance of the interim report.

Respectfully,

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[6] Nuclear Energy Institute. Safety: The Nuclear Energy Industry's Highest Priority. Jun. 2015