BEFORE THE
STATE OF NEW YORK
BOARD ON ELECTRIC GENERATION
SITING AND THE ENVIRONMENT

In the Matter of

Baron Winds LLC

Case 15-F-0122

March 24, 2023

Prepared Testimony of:

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Q. Please state your name, employer, and business address.

A. My name is Miguel Moreno-Caballero. I am employed by the New York State Department of Public Service (DPS or Department). My business address is Three Empire State Plaza, Albany, New York 12223.

Q. Mr. Moreno what is your position at the Department?

A. I am a Utility Engineering Specialist 3 (Acoustics) in the Environmental Certification and Compliance section of the Office of Electric, Gas and Water.

Q. Please summarize your educational background and professional experience.

A. I attended the Pontifical Xaverian University in Bogota, Colombia and received a Bachelor of Science in Civil Engineering in 1986. Thereafter, I continued my education at Universidad del Norte in Barranquilla, Colombia and graduated with a Master of Business

Administration degree in 1992. I have accumulated more than 25 years of experience in the field of acoustics and noise control. I owned and operated my own business in Colombia for about 13 years, where I worked as an acoustical consultant and acoustical contractor. I designed and built noise abatement solutions for emergency generators, industrial machinery, HVAC equipment, and interior acoustical designs for indoor spaces. I obtained extensive experience in noise control including noise surveys and computer simulations of aircraft noise for two international airports.

After my arrival to the United States, I was employed as a Senior Acoustical Consultant by an acoustical consulting firm in Washington D.C., from October 2005 until May 2008. There, I analyzed sound surveys and performed computer noise modeling for roadways and highways and designed mitigation measures such as barriers and selected building envelope specifications

for environmental noise control. I also designed noise control solutions for mechanical equipment and interior acoustics for indoor spaces for a variety of projects. From May 2008 to June 2009, I was employed by an acoustical consulting company in Manhattan and worked for several acoustical and noise control projects including data centers and corporate projects. I joined the Department in November 2013. My duties include reviewing PSL Article VII and Article 10 pre-applications, applications, environmental noise assessments, noise surveys, and mitigation measures. I also review sound collection protocols and witness sound measurements to ensure compliance with Certificate Conditions. I am a full-member of the Institute of Noise Control Engineering and the Acoustical Society of America.

Q. Mr. Moreno, which projects have you reviewed under PSL Article 10 and Article VII regulations?

A. Under Article VII regulations, I have reviewed the applications in several certified cases, including, Case 13-T-0515, New York Power Authority; Cases 13-T-0538 and 13-T-0350, DMP New York, Inc. and Williams Field Services Company LLC; Case 15-F-0040, PSEG Power New York, Inc; and Case 13-T-0586, Consolidated Edison (Con Edison) Company of New York, Inc. I am currently assigned to numerous PSL Article 10 proceedings regarding wind generating facilities at various post-Certificate stages, including the following projects: Case 14-F-0490, Cassadaga Wind, LLC; Case 15-F-0122, Baron Winds, LLC; Case 16-F-0062, Eight Point Wind, LLC; Case 16-F-0267, Atlantic Wind, LLC (Deer River) ; Case 16-F-0205, Canisteo Wind Energy, LLC; Case 16-F-0328, Number Three Wind, LLC; Case 16-F-0559, Bluestone Wind, LLC; Case 17-F-0282, Alle-Catt Wind Energy, LLC; and Case 18-F-0262, High Bridge Wind). I am also assigned to multiple PSL Article 10 proceedings regarding

solar generating facilities at various stages, including the following projects: Case 17-F-0617, Hecate Energy Albany 1, LLC and Hecate Energy Albany 2, LLC; and Case 17-F-0619, Hecate Energy Greene 1 LLC, Hecate Energy Greene 2 LLC, and Hecate Energy Greene County 3 LLC.

Q. Mr. Moreno, what is your role in reviewing projects filed under Article 10 of the PSL?

A. My duties generally include the review of preliminary scoping statements, stipulations, applications, and post-Certificate compliance filings as they relate to the noise assessments and avoidance or minimization of environmental noise impacts from major electric generation facilities. My role regarding wind generating projects consists of reviewing application and compliance filing sections related to noise impact assessments from construction and operation of the facilities, which includes: pre-construction ambient noise surveys; analysis of existing or potential future prominent tones;

noise modeling parameters; assumptions and results; amplitude modulation; low-frequency noise; infrasound; potential for hearing damage; indoor and outdoor speech interference; interference with the use of outdoor public facilities and public areas; community complaint potential or annoyance; and the potential for interference with technological, industrial, or medical activities that are sensitive to vibration or infrasound. I also review applicable noise standards and guidelines, local regulations on noise, design goals for the facilities, noise abatement measures, complaint resolution plans for noise from construction and operation of proposed facilities, proposed post-construction noise evaluations, and compliance for conformance with certificate conditions.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to address issues with the information submitted by Baron Winds LLC (Baron Winds) in Appendix C of the Petition

for Amendment of the Certificate for Baron Winds Phase II (Phase II Amendment Petition).

Q. Are you sponsoring any exhibits?

A. Yes, I am sponsoring Exhibit__(MMC-1), which consists of Baron Winds' responses to Staff Interrogatory request(IR) DPS IR 2.1 regarding wind direction and the Noise Reduction Operations Plan (NRO Plan); Exhibit__(MMC-2), which consists of Baron Winds' responses to DPS IR 2.2 regarding wind speed and the NRO Plan; and Exhibit__(MMC-3) which consists of Baron Winds' responses to Staff IR DPS 2.3. regarding sound power levels from the turbines.

Q. Briefly describe the issues you identified.

A. The main issue with the filings is the Noise Reduction Operations (or NRO) Plan that Baron Winds has proposed for Phase II.

Q. What are unmitigated and mitigated sound power levels of a wind turbine?

A. Sound power levels correspond to the sound levels a turbine can generate – typically at

downwind conditions. They are determined indirectly from measurements conducted by turbine manufacturers that follow international standards. The International Electrotechnical Commission (IEC) 61400-11 standard adopted for this case, requires measuring sounds at the downwind position, i.e., at a receptor towards which the wind blows from a turbine. Unmitigated sound power levels correspond to levels of the standard/basic modes of operation of the turbines without applying any NROs. Mitigated sound power levels correspond to the sound power levels of the turbines when an NRO is applied. The magnitude of the NRO can be calculated by subtracting the mitigated from the unmitigated sound power levels. For instance, if a turbine has an unmitigated sound power level of 107.5 A-weighted decibels (dBA) but needs to be set into a mitigated sound power level of 100 dBA, it means that the turbine needs a 7.5 dBA NRO to comply with the design

goals or noise limits (107.5 dBA - 100 dBA = 7.5dBA).

Q. Please explain what an NRO Plan is.

A. An NRO Plan is a schedule of how Noise Reduction Operations will be implemented on the turbines during operation throughout the lifespan of the Project. In simple terms, a project could have devices that will measure weather indicators (e.g., temperature, wind speed, wind direction, precipitation, etc.) and the turbines can be programmed and may use some of those parameters to modify how the turbines will operate. For instance, the turbines can be programmed to shut down if the wind speed is too high. If the wind speed increases and causes a noise level to exceed a limit, the turbine can be programed to operate in noise reduced mode of operation so that the noise levels are lower and comply with the limits. One of the ways that this can be accomplished is by turning the blades so that the rotor can rotate slower. An NRO Plan also

contains the variables that will be monitored to operate the turbines and put them out of operation, in normal operation, or in noise reduced mode.

Q. Does the Phase II Amendment Petition request any changes to the way NROs are determined or how they will be implemented?

A. No, it does not. While Section 2.3 of Appendix C to the Phase II Amendment Petition, the Pre-Construction Noise Assessment (Phase II PNIA) entitled "Changes in Annual NRO Modeling Procedure," contains changes regarding how NROs are determined, Baron Winds did not request the Siting Board adopt these changes or provide any discussion of these changes in the Notice of Petition or the body of the Phase II Amendment Petition.

Q. Are changes to the way NROs are determined, or how they will be implemented, proposed in the Phase II PNIA?

A. Yes; however, changes in the way NROs are

determined or how they will be implemented during operation of the Project are barely discussed in the Phase II PNIA. The NRO Plan filed in DMM on November 8, 2022, contains some of the details about how NROs are proposed to be implemented after construction and shows that Baron Winds is proposing to use an NRO Plan that takes into account wind direction.

Q. Why is that important?

A. Currently 5 out of the 15 turbines proposed for Phase II account for wind direction in the NRO Plan. Changes between one NRO mode and another mode of operation due to variations on wind direction can be as high as 8 dBA. As I will discuss later in my testimony, the absence of sound information from the manufacturers in addition to other inaccuracies associated with the NRO Plan, could make abrupt changes like this very noticeable and could result in exceedances of the noise limits of the Certificate Order. Further, nothing in the

Certificate Conditions of the Order restricts Baron Winds from using different turbine models or configurations in the final design for construction, which could result in the number of turbines that account for wind direction, as well as the magnitudes of those changes, to be higher than as reported in the NRO Plan included in the Phase II Amendment Petition.

Q. Please explain how the NRO Plan is different from the information presented in Application Exhibit 19 and the Application PNIA.

A. Application Exhibit 19 and the Application PNIA, including how the NROs were calculated and presented, were prepared in accordance with the agreed upon pre-Application Stipulations and did not include an NRO Plan that accounts for wind direction. Although both the Application PNIA and Application Exhibit 19 contain general statements that indicate that NROs "can be programmed for selected wind speeds, wind directions, and times of day," nothing in the

Application PNIA or Application Exhibit 19 indicates that for Baron Winds the NROs were estimated or proposed to be implemented based on wind direction. In other words, the same mitigated sound power levels and NRO were assumed to be applied and remain unchanged at any wind direction for each wind turbine for which an NRO was needed.

Q. How were NROs presented in the Application?

A. Unmitigated and mitigated sound power levels for the turbines were calculated and presented in Table 28 of the Application PNIA.

Q. Does the NRO Plan comply with the Certificate Order for Baron Winds?

A. No. Certificate Condition 1 authorized Baron Winds to construct and operate the Facility as described in its Application and clarified by its supplemental filings, updates and replies to discovery data requests, additional exhibits, except as waived, modified or supplemented by the Siting Board in the Certificate Order.

While Baron Winds was authorized to construct and operate the Facility as described in the Application, the methodology for how NROs are now proposed to be applied is different than as stated in the Application. Because Baron Winds has not requested any changes to Certificate Conditions, it should be required to construct and operate the Phase II Facility by applying the NROs as specified in the Application and supplements as of the date of the Certificate Order.

Q. Is the NRO Plan in conflict with any other Certificate Conditions of the Order?

A. Yes. According to Certificate Condition 11, Baron Winds must implement the minimization and mitigation measures as described in the Application or any other documentation presented before the Order was issued. Therefore, again, Baron Winds should operate the Phase II Facility by applying the NROs as specified in the Application and Supplements, which were adopted

and not modified by the Certificate Order.

Q. Please briefly explain the NRO Plan submitted by Baron Winds in the Phase II Amendment Petition.

A. The NRO Plan currently proposed for Baron Winds Phase II is based on two variables: the wind speed at hub height and the direction of the wind. While I do not object to the NRO Plan's proposal to activate noise reductions operations based upon the wind speed at the hub-height, I see several issues with the plan proposed by Baron Winds based on the wind direction. In the NRO Plan, Baron Winds proposes, in several cases, decreasing or even eliminating an NRO depending on the direction of the wind, rather than using the same NRO at all wind directions for each wind speed.

Q. Is this explained by the Certificate Holder?

A. Yes. In the Phase II PNIA, Section 2.3 entitled Changes in Annual NRO Modeling Procedure, the Certificate Holder explains: "In previous modeling (before the March 2020 supplemental

modeling), if NROs were necessary, then they were applied to a specific turbine for all wind speeds and all wind directions. This is unnecessarily conservative, since turbine sound powers will be well below the specified maximum for lower wind speeds (6 m/s for example), meaning that NRO will not be necessary. The same applies to wind directions. If a receptor is upwind of the closest turbine(s), then the same NRO may not be necessary as is required during downwind conditions. The current modeling takes this into account in the same way that the March 2020 modeling did, modeling turbines that are placed into NRO individually, allowing application of NRO for only the necessary wind speeds and directions."

Q. Do you agree with the statements from Baron Winds?

A. No, I disagree with several statements. First, I should clarify that there are two different issues related to the changes described in

Appendix C: one is whether the changes proposed could be used for estimating long-term noise impacts before the Facility is built, particularly to demonstrate compliance with Certificate Condition 68(e)(i)-(iii), and the other is whether the changes could be used to prepare an NRO Plan that will be implemented in real time, after construction, during operation of the Facility, and throughout the life span of the Project.

Q. Please explain.

A. First, as related to changes based on wind speed, I do agree that when sound power levels from the turbines are sufficiently low, such that they do not result in any exceedances of design goals to be shown in revised sound modeling or to the regulatory limits after construction, NROs do not need to be activated. Second, I have no objection to changing NRO operations if the wind speed at hub height changes, as long as the NROs are determined by

using manufacturers' data as required by the IEC standards specified in Certificate Condition 68(d)(i) for the following purposes: Compliance Filings and the NRO Plan for operation after construction. This is the way NROs are typically implemented and required for any project certificated under PSL Article 10 and for any new projects permitted under the Executive Law §94-c regulations.

Q. If the current NRO Plan differs from the Application, how was the modeling prepared for the Application?

A. As explained in the 2017 Application: "Two types of modeling were performed. The first estimated the highest one-hour Leq (L1h) that will be produced by the Project. This modeling was performed according to ISO 9613-2. The second method was used to calculate seasonal and annualized long-term average and statistical Project sound levels. This method used the ISO 9613-2 methodology with CONCAWE meteorological

adjustments along with a year's worth of site-specific meteorological data to calculate sound levels at each receptor for every hour of that year. From this nightly, daily, seasonal, and annual statistical sound levels were calculated" (PNIA p.5). "Some sound level design goals are based on averaging times longer than one hour. As noted above, this was modeled using ISO 9613-2 with hourly meteorological adjustments calculated with CONCAWE" (Id., p. 6).

Q. What does this mean?

A. In simple terms, for short-term noise impacts, the standard to be used was the ISO 9613-2 for which wind direction is disregarded. Wind direction was only supposed to be accounted for in the calculation of long-term noise impacts.

Q. Was wind direction considered for determination of NROs in the Application phase?

A. No. The modeling presented in the Application phase through the hearings, incorporated wind direction only for the limited purposes of

reporting long-term sound levels (summer, winter, and 1-year), as required by 16 NYCRR §1001.19(f) and Stipulation 19(f), not for implementation of the NROs during operation of the Facility. This is evidenced by the executed Stipulations, which provide that the calculations of CONCAWE corrections will be based on estimates of hourly turbine sound power levels and for the purpose of addressing the long-term requirements of the regulations indicated in 16 NYCRR §1001.19(f) exclusively and the maximum Leq-8-hour noise level. In particular, the CONCAWE corrections were stipulated to be used "to provide A weighted sound levels with averaging times greater than one hour at all sensitive and participating sound receptors, as required by Section 19(f)" (Executed Stipulation 19(d)(2), pp. 16-17). Further, Section 19(f) of the executed Stipulations refers to long-term periods such as entire seasons (summer and winter), one-year,

and the calculation of the single night (8-hour period) that reaches the maximum noise level in an entire year.

Q. Did any section of the Article 10 regulations or the signed Stipulations allow the use of the CONCAWE meteorological correction for calculations for periods less than 1-hour?

A. No. There is no stipulation or portion of the regulation allowing the Certificate Holders to use the CONCAWE meteorological adjustments for periods of less than 1 hour. In addition, no portion of the Stipulations discusses NRO plans or accounts for changes in wind direction in preparation of an NRO Plan. Further, 16 NYCRR §1001.19(d) does not allow for assuming any attenuation of sound that transiently occurs due to weather or temperature when estimating noise levels to be produced by operation of a facility.

Q. Was the NRO Plan presented in the 2020 Petition for Amendment of the Certificate?

A. No, an NRO Plan that accounts for wind direction was never presented to the Siting Board in the 2020 Petition for Amendment of the Certificate. Although Section 2.3, Appendix C to the 2020 petition discussed changes in the way NROs were to be applied, that discussion was referred to as "Changes in Annual NRO Modeling Procedure" not as changes to short-term modeling procedures (2020 Petition, Appendix C, PNIA, p. 9).

Q. Has an NRO Plan that factors wind direction been presented or approved for any projects under the Article 10 regulations?

A. An NRO Plan that factors wind direction has not been presented for any projects under Article 10, except for Baron Winds Phase I during its compliance filings and in connection with the Phase II Amendment Petition. Although the NRO Plan for Phase I was approved for the Compliance Filings, the Commission specifically noted that due to the unique circumstances of the record in the Phase I Amendment proceeding, the NRO Plan

should not be relied upon as indicative of any future approvals for the Phase II facility, nor as precedent in other cases.

Q. If Baron Winds requested an amendment to allow the use of an NRO Plan that accounts for wind direction, would you oppose that amendment?

Q. Yes, I would oppose that amendment. I disagree with using wind direction to prepare an NRO Plan, which would change NROs based on wind direction as often as every 10-minutes during operation of the Project.

Q. Please explain.

A. As indicated in Baron Winds' response to DPS-IR-2.1 section 2 (e), Exhibit __ (MMC-1), the criteria for changing from one operation mode to another during operation of the Facility would be based on the 10-minute time interval. In other words, it could be as short as 10 minutes. This is not how the short-term noise impacts were calculated and presented in the Application. It is inappropriate that CONCAWE

meteorological corrections that should be used only for the calculation of long-term noise impacts and time-frames greater than an hour, are now being used to propose an NRO Plan that will be implemented for time periods as short as every 10 minutes, which could change the mode of operation and the NROs of the turbines several times during an hour.

Q. Do you find any other issues with NRO Plan proposed by the Certificate Holders?

A. Yes, the NRO plan proposed does not have the accuracy that is needed to account for wind direction in the short-term. In the Plan, NROs will be reduced or eliminated at selected points 45 degrees apart. While this could be appropriate for estimating long-term noise impacts with computer noise models in the Application or during Compliance Filings before construction starts, it is not appropriate for a real-time, short-term oriented NRO Plan during operation. Reducing an NRO Plan to eight 45-

degree segments will result in inaccuracies in its implementation. In other words, for the software controlling the turbines, deciding when to change or eliminate an NRO, segments of 45 degrees are too high to be appropriately accurate. Furthermore, no supporting information from the manufacturer has been provided confirming that the sound levels from the actual turbines proposed to be installed in the Project will perform as expected for the wind directions indicated in the Plan. In addition, fluctuations of wind direction in periods lower than an hour (10-minute) may result in intermittent periods of application, modification, or elimination of NROs, or in changes to different modes of operation. Therefore, the Plan will most likely result in abrupt changes in sound levels at the receptors that, depending on the magnitude, could be perceptible and bring the Facility out of compliance with the Certificate Conditions. In

summary, the NRO Plan proposed by Baron Winds has no basis, is inaccurate, unsupported, and should be rejected.

Q. What are additional technical reasons for your objections to changing NROs based on wind direction?

A. The NRO Plan is not supported with any information from the manufacturers. In response to DPS IR 2.3, Exhibit __ (MMC-3), and when asked about whether any sound power level information from the manufacturers of the turbines proposed for Baron Winds Phase II was available at any direction other than the downwind direction for the different modes of operation including any noise reduction operation, Baron Winds stated that any sound data available assumes a downwind condition. What this means is that, in this proceeding, sound manufacturer information for the turbines is only available for the downwind direction but not for any other wind direction or, if

available, such information may not be disclosed in this case. In addition, in my professional practice, I do not recall seeing any information from the manufacturers for any wind direction other than the downwind direction required by the IEC standards. Further, in response to DPS IR-2.3, Exhibit __ (MMC-3), Baron Winds has indicated that "not all specifications and modes are currently available from the manufacturer for the 4.5. For purposes of the modeling conducted for the Amendment, Vestas advised Baron Winds to use the available data for the V150 4.2 for modes PO2, SO1, SO2 and SO3 when modeling for V150 4.5 noise impacts." Therefore, there is no factual basis to support an NRO plan such as the one presented by the Certificate Holders in this case. The reduction or elimination of NROs for some ranges of wind direction for a particular wind speed indicated in the NRO Plan is not supported with actual data from the manufacturers for the turbines

proposed to be installed in Phase II.

Q. If Baron Winds requested an amendment to allow the use of an NRO Plan that accounts for wind speed, would you oppose that amendment?

A. No, I would not oppose that amendment provided the Plan is based on actual information for the turbines and the modes of operation proposed for the Project.

Q. What are the technical reasons as to why you would not object to changing NRO operations based on wind speed?

A. As stated, I do agree that NROs should be applied based on wind speed and only at wind speeds that produce exceedances to the design goals and the regulatory noise limits specified in the Certificate Order, but NROs do not need to be applied at wind speeds that would not result in any exceedances. In addition, the number of decibels that need to be applied on each turbine as an NRO depends on the magnitude of the exceedances. If the exceedance is

greater, the NRO must be greater. If the exceedance is lower, an NRO can be reduced. If there is no exceedance, the NRO can be eliminated. This is supported by most turbine manufactures who publish the sound power levels generated by their turbines at different wind speeds, not only for the basic modes of operation but for NROs as well. In this case, however, I see an issue with the Applicant using sound power level information from turbine models that are different than the ones proposed here. For that reason, I would not recommend approval of the NRO plan as presented here until all of those issues are resolved.

Q. What is your recommendation?

A. The NRO Plan should be prepared based on wind speed only and approved only if the different modes of operation including NROs are supported with actual information from the manufacturers for the turbines proposed for the Project. However, an NRO Plan prepared to account for

wind direction should be rejected for the reasons that I have explained. In other words, the NRO Plan should be prepared and implemented by applying the same NROs at all wind directions for each wind speed, as presented in the Application.

Q. What are your recommendations regarding the Phase II Amendment Petition?

A. I recommend that the Siting Board reject the Certificate Holder's implicit proposal to account for wind direction when preparing the NRO Plan. In other words, I recommend that the Siting Board require the Applicant to present an NRO plan that uses the same NROs applied at any wind direction for each wind speed for the turbines for which an NRO is needed. Baron Winds may decrease the magnitude of NRO for wind speeds lower than the wind speeds that create exceedances, provided the reduction in NROs do not cause an exceedance of any design goals and/or noise limits and is fully supported with

information from the manufacturers. Finally, if the Phase II Amendment Petition is approved, the approval should not relieve Baron Winds of the need to comply with the terms, conditions, limitations, or modifications of the construction and operation of the Facility authorized in the Certificate, and Baron Winds should be required to comply with the established procedures for compliance filings. This includes the presentation of a new NRO Plan as recommended here.

Q. Does this conclude your testimony?

A. Yes.