STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Application of Cassadaga Wind LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article 10 to Construct a Wind Energy Project. **Case No. 14-F-0490**

INITIAL BRIEF BY INTERVENOR CONCERNED CITIZENS OF THE CASSADAGA WIND PROJECT

Pursuant to the parties' agreement, a common Table of Contents for initial briefs has been adopted. Concerned Citizens for the Cassadaga Wind Project ("CCCWP") hereby submits briefing arguments on the following subjects listed in the common Table of Contents:

3. Article 10 Findings (incl. Burden of Proof

25.1 Sound Levels and Related Public Health Issues

29.B. Proposed Findings

ARTICLE 10 FINDINGS (INCL. BURDEN OF PROOF)

The burden of proof that its project proposal should be approved is on the applicant, (SAPA § 306(1)), including the burden to "provide sufficient information for us to make all of the statutory findings".[1] "If the applicant does not provide sufficient information to persuade us or to allow us to make all the required statutory findings in the

1 Case 06-T-0650, *Application of New York Regional Interconnect Inc. for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII for a high voltage direct current electric transmission line*, Order Upholding Procedural Ruling and Denying Stay, 2009 N.Y. PUC LEXIS 135, *30 (February 18, 2009).

manner desired by the applicant, the Commission may deny the application for a Certificate."[2] "An applicant may elect not to investigate [an issue] proposed by other parties; however, it does so at its own peril."[3]

Once the applicant presents its position on an issue, "a party introducing an opposing point of view is required to demonstrate that it is persuasive."[4] The burden of going forward on an issue supporting certificate denial must show how that issue "would prejudice the public good".[5]

Parties are "allowed to attempt to provide the evidence necessary to establish, if they can, the rational basis needed for an inference of imprudence."[6]

An evaluation of noise and health issues has been hampered in this matter by the applicant's mischaracterization of guideline values issued by the World Health Organization ("WHO"), its use of industry standards that assess wind turbine noise by means of annual average sound levels, and its failure to characterize wind turbine noise in terms of its frequency and pulsating qualities, as if in this context sound descriptors that

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2 *Id.*

3 *Id.*, *31.

4 Case 01-F-0761, *Application by KeySpan Energy for a Certificate of Environmental Compatibility and Public Need to Construct and Operate a 250 Megawatt Combined Cycle Electric Generating Facility to be Developed in the Town of Huntington, Suffolk County*, Opinion and Order Granting Certificate of Environmental Compatibility and Public Need, 2003 N.Y. PUC LEXIS 240, *48 (May 8, 2003).

5 Case 94-E-0136, *Petition of Sithe/Independence Power Partners, L.P. for an Original Certificate of Public Convenience and Necessity*, Order Denying Petition for Rehearing, 1995 N.Y. PUC LEXIS 61, *17 (March 16, 1995).

6 Case 14-E-0270, *Petition Requesting Initiation of a Proceeding to Examine a P roposal for Continued Operation of the R.E. Ginna Nuclear Power Plant, LLC*, ALJ Ruling on Scope of Issues for Hearing, 2015 N.Y. PUC LEXIS 219, *13 (May 14, 2015).

specifically mask these qualities such as a time-averaged A-weighted equivalent-energy (Leq) descriptor are reliable. The information required by the Article 10 regulations has therefore not been provided. *Cf.*, *e.g.*, 16 N.Y.C.R.R. § 1001.19(n) (noise models "shall fairly match the unique operational noise characteristics of the particular equipment models and configurations proposed for the facility").

25.1 SOUND LEVELS AND RELATED PUBLIC HEALTH ISSUES

The applicant denies that wind turbine noise results in health harms

The applicant contends that the WHO guidelines lack scientific support, denies the importance of sound events in causing sleep disturbance, and asserts that noise annoyance is unrelated to health harms:

> The WHO guidelines indicate that evening sound levels in the range of 40-45 dB should avoid annoyance for most individuals and that community noise can be evaluated by assessing the extent of annoyance (e.g., low, medium, high) (WHO 1999); however, little scientific rationale for this statement is provided (in this or in the WHO 2009 update). Furthermore, this general guideline fails to address the perception specific sounds may have on some people at any perceptible level (e.g., dripping faucet, mosquito buzzing, mouse running across the floor, neighbor's wind chime, distant voices, buzzing of LED lighting or music, etc.), any of which might be annoying to some individuals, especially at night, or depending on other circumstances (insomnia due to family or work stress, uncomfortable temperature level, bodily pain, etc). These noises, however, like wind turbine emissions, do not cause disease or other harm to human health, and

> as noted above, the perception of or response to these noises might be enhanced in the presence of some underlying health problem. Moreover, even if there was a scientific connection between the WHO guidelines and annoyance, to the extent that the levels of wind turbine noise is kept below the WHO suggested guidelines, annoyance should be minimized. (Tr. 1225:1-17) (Mundt).

Contrary to this statement, the WHO 1999 guidelines indicate that indoor sound levels should be limited to *below* 30 dBA where, as here, the background sound level is low. Specifically, the guidelines recommend limiting exposure to noise indoors to 30 dB LAeq over the eight-hour nighttime period, and 45 dB LAmax outdoors over the same period. Ex. 67, WHO (1999), at xiv, xvi (Table 1) and 40. "To protect sensitive persons, a still lower guideline value would be preferred when the background level is low." *Id.*, at 40.

The background sound level in the Project Area ranges between 16 and 27 dBA (L90), (Applic., Appx. Z, 195-214 (Table 30)), consistent with "very quiet rural and wilderness areas". Tr. 1755:1-5 (James). LAmax can be approximated by adding 11 dB to the modeled broadband Leq sound level, using the ISO 9613-2 model utilized by the applicant. *See* Ex. 135, at 2 (RSG, noting that based on post-construction measurements, the MassCEC study measured "LFmax values from about 6 dB to 11 dB greater than the Leq", and electing to add 11 dB to the modeled Leq to derive an LAmax for a wind project in Almer Township, MI).[7] The MassCEC study offered by the applicant shows

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7 It should be acknowledged that the LAmax isolines included with the Almer Township memo, (Ex. 135, at 4), do not indicate the number of times during a given period the LAmax target would be reached and, despite its emphasis on limiting the number of such sound events, the WHO guidelines do not indicate the number of such events below which health effects would not be expected. The LAmax guideline could nevertheless inform the project's design goal and, if a maximum number of LAmax sound events were determined, could inform an

that at relevant low frequencies homes can have a 5 dB or less decrease from outside to inside at frequencies perceived as "rumble." This is important because the WHO assumes that there is a 15 dBA decrease from outside to inside assuming noise sources with spectrums typically found in urban environments, such as broadband sounds from traffic, industry, airports, trains, and other human activities. Ex. 67, (WHO 2009), at 11 ("When windows are slightly open, outside sound levels are usually reduced by 10–15 dB."). Thus, starting with 30 dBA in the bedroom, WHO adds 15 to get 45 dBA Leq as the health-protective outdoor sound level. Ex. 67 (WHO 1999), at xiv ("This value [45 dBA] was obtained by assuming that the noise reduction from outside to inside with the window open is 15 dB."). However, assuming a 5 dB reduction from outside to inside, one would derive 35 dBA Leq as the outside level protective of health.

Also, WHO does not say that low noise levels "do not cause disease or other harm to human health". To the contrary, the WHO guidelines indicate that low noise levels at night that result in sleep disturbance harm human health, specifically by causing "difficulty in falling asleep; awakenings and alterations of sleep stages or depth; increased blood pressure, heart rate and finger pulse amplitude; vasoconstriction; changes in respiration; cardiac arrhythmia; and increased body movements. . . . The secondary, or after-effects, the following morning or day(s) are: reduced perceived sleep quality; increased fatigue; depressed mood or well-being; and decreased performance." Ex. 67, WHO (1999), at ix-x.

Indeed, the purpose of the 1999 WHO recommendations is to present guideline values "for the onset of health effects from noise exposure". *Id.*, 38. In that regard, WHO plainly states that noise annoyance that disturbs sleep is a health harm:

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operation-phase monitoring regime.

> Sleep disturbance from intermittent noise events increases with the maximum noise level. Even if the total equivalent noise level is fairly low, a small number of noise events with a high maximum sound pressure level will affect sleep. . . . It should be noted that low-frequency noise, for example, from ventilation systems, can disturb rest and sleep even at low sound pressure levels. *Id.*, xii-xiii.

> The capacity of a noise to induce annoyance depends upon its physical characteristics, including the sound pressure level, spectral characteristics and variations of these properties with time. During daytime, few people are highly annoyed at LAeq levels below 55 dB(A), and few are moderately annoyed at LAeq levels below 50 dB(A). Sound levels during the evening and night should be 5-10 dB lower than during the day. Noise with low-frequency components require lower guideline values. For intermittent noise, it is emphasized that it is necessary to take into account both the maximum sound pressure level and the number of noise events. *Id.*, viii.

In 2009, based on new medical evidence, the WHO issued supplemental guidelines, including a limit of 40 dBA outside at night:

> There is no sufficient evidence that the biological effects observed at the level below 40 dB Lnight,outside are harmful to health. However, adverse health effects are observed at the level above 40 dBLnight,outside, such as self-reported sleep disturbance, environmental insomnia, and increased use

> of somnifacient drugs and sedatives. . . . Therefore, 40 dB Lnight,outside is equivalent to the LOAEL [lowest observed adverse effect level] for night noise.

Ex. 67 (WHO 2009), at xvi. It is thus overly simplistic, and contrary to the WHO guidelines, to assert that noise-induced annoyance does not cause health harms.

Shepherd et al. (2011) note that in contemporary medicine, annoyance exists as a precise technical term describing a mental state characterized by distress and aversion, which if maintained, can lead to a deterioration of health and well-being. *See* Ex. 67, 31-32 (citing and discussing Shepherd et al. (2011). The authors provide a model showing how wind turbine noise can lead to primary health effects of sleep disturbance in response to annoyance, and to secondary health effects involving reductions in quality of life and general well-being, and stress-related disease caused by chronic annoyance and sleep disturbance. The multiplicity of relationships represented in the model shows why it is difficult with current study designs to determine with certainty the association between turbine noise exposure and health-related outcomes. Focusing on "direct" causal links alone is unwarranted. Such a focus limits the discussion to a small slice of the potential health effects of wind turbines, because "indirect" pathways are also relevant to the symptoms experienced by exposed people.

The applicant's health expert avers that concern with annoyance caused by wind turbine noise fails to identify any "direct adverse health consequences" of noise, (Tr. 1508:8-16), defined narrowly as "hearing loss". Tr. 1505:14-16. Accordingly, the applicant declines to address the health risks of chronic sleep disturbance. This is a serious issue because wind turbines operate mostly at night, generate pulsating noise, and "almost 90 percent of the acoustic energy of a wind turbine occurs below 31 hertz". Tr.

1806:16-17 (James). Duncan et al. (2015) provides actual measurements of wind turbine noise clearly showing a substantial component of the noise is found in frequencies below 1000 Hz such that, when the turbines in a project are turned off the low frequency sound pressure level in the environment declines dramatically. *See* Ex. 146, at 6, graphic for "Beginning of a Shutdown Period" (showing the low frequency region is filled with acoustic energy (colored red-yellow) that disappears when the turbine goes off). In the field, an array of wind turbines generate several pulses within the period averaged by measuring sound with an Lmax(fast) setting on the sound meter, which is 125 milliseconds. Tr. 1790:3-5 (James).[8] "Activity in the auditory system up to the brainstem nucleus inferior colliculus occurs within 10 milliseconds after the onset of a sound." Ex. 67 (WHO 2009), at 46. *See also* Tr. 1789:25 to 1790:1 (James). These pulses are thus detectable sound events. A sound study utilizing one-hour or longer average sound levels does not report such sound level pulses.

Based on the narrow scope of its assessment of health risks, the applicant fails to report the full range of low-frequency sound generated by the industrial-scale wind turbines it proposes to install in the Project Area and does not report the maximum sound level in wind turbine noise pulsations. *Cf.* Tr. 1867:14 (Kaliski) ("amplitude modulation will occur in varying degrees"). Instead, the applicant reports A-weighted sound levels averaged over one hour, eight hours, or annually, which removes evidence of variations in generated sound levels, including pulsations. This information should have been provided pursuant 16 N.Y.C.R.R. § 1001.19(e), which requires the applicant to provide information

8 Lmax (and Lmin) are the highest (and lowest) average values measured by the sound level meter over a given period of time. Fast sets the sound meter to record maximum and minimum readings every 125 milliseconds. Slow sets the sound meter to record every 1 second.

about "amplitude modulated sound . . . and an analysis of whether the facility will produce significant levels of low frequency noise or infrasound."[9] Article 10 does not authorize exclusive reliance on time-averaged A-weighted sound levels. Sound levels reported with the A-weighting metric are "weighted towards the audibility spectrum of the human ear." Tr. 2179:8-9 (Moreno-Caballero). "A-weighted measurements are not an adequate indicator of annoyances when low frequencies are dominant." Tr. 1744:3-5 (James, discussing Kelley (1982). See also Tr. 1621:9-11 (Punch) ("A-weighting . . . effectively filters out ILFN [infrasound and low frequency noise], a major component of wind turbine noise and a major cause of AHEs."); Ex. 67 (WHO 1999), at 58 ("Since A-weighting underestimates the sound pressure level of noise with low-frequency components, a better assessment of health effects would be to use C-weighting."); Ex. 76 (Punch and James: A-weighting "drastically reduces sound-level readings in the lower frequencies, beginning at 1,000 Hz, and reduces sounds at 20 Hz by 50 dB").

Inaudible low frequency noise is recognized in the Article 10 regulations as a potential cause of adverse health effects. Exhibit 15 requires that wind energy facilities be evaluated for the health effects of "audible frequency noise" *and* "low-frequency noise". 16 N.Y.C.R.R. § 1001.15(e). The evaluation must include "all reasonably related short-term and long-term effects". 16 N.Y.C.R.R. § 1001.15(g). This required information was not provided by Cassadaga Wind. Instead, its sound study and experts simply contend that no significant adverse effects of any kind will result from wind turbine low frequency noise, infrasound and pulsations.

As noted above, this contention is based on the asserted absence of "direct adverse

9 "Infrasound is defined as frequencies between 0 to 20 Hz. Low-frequency sound typically refers to frequencies between 20 to 250 Hz, although some authorities suggest that it may extend to 500 Hz." Tr. 1513:19 to 1514:1 (McCunney).

health consequences" of noise, (Tr. 1508:11), or of a "direct causal link" to health impacts. Tr. 1505:11. However, the federal Reference Manual on Scientific Evidence rejects the use of "direct causation":

> In many instances, causation can be established without epidemiologic evidence. When the mechanism of causation is well understood, the causal relationship is well established, or the timing between cause and effect is close, scientific evidence of causation may not be required. This is frequently the situation when the plaintiff suffers traumatic injury rather than disease.[10]

Here, "the timing between cause and effect is close" because, similar to a case-crossover study, when people exposed to wind turbine noise are suffering health harms, the harms disappear when the exposure stops, and return when those people move back to the area of exposure. Ex. 76, at 35-36 (discussing research by McMurtry) and 4-42 (discussing research by Phillips recommending the "case-crossover" design).

The Reference Manual also discounts "scientific determinations of causation," notes that "epidemiology cannot objectively prove causation", and concludes that "[w]hile the drawing of causal inferences is informed by scientific expertise, it is not a determination that is made by using scientific methodology." Tr. 1637:4 to 1638:3 (Punch) (quoting *Reference Manual on Scientific Evidence 3d*, at 600). *Compare* Tr. 1693:4-16 (McCunney asserting a contrary opinion). For drawing causal inferences, the Reference Manual relies instead on "criteria proposed by the U.S. Surgeon General in 1964 in assessing the relationship between smoking and lung cancer and expanded upon

10 Federal Judicial Center, *Reference Manual on Scientific Evidence 3d* (2011), 609.n.180, available at <https://www.fjc.gov/content/reference-manual-scientific-evidence-third-edition-1>, and discussed at Tr. 1637:4 to 1638:17 (Punch).

by Sir Austin Bradford Hill in 1965". *Reference Manual on Scientific Evidence 3d*, at 600. Based on these nine factors, Concerned Citizens has carried its burden of going forward on the issue of health risks of wind turbine noise without having to prove direct causality. Tr. 1638:4-17 (Punch).

The applicant's health expert Dr. McCunney acknowledges that sleep disturbance is related to increasing sound pressure levels, (Tr. 1511:1-4); and wind turbines generate low frequency noise and infrasound. Tr. 1509:10-12. Nevertheless, McCunney emphasizes psychogenic and other nonacoustical factors associated with annoyance such as visual effects and economic benefits for those hosting wind turbines.
Similarly, Colby et al. (2009) try to explain annoyance with wind turbine noise by pointing to psychogenic and other nonacoustical factors, but also acknowledge that wind turbine noise causes annoyance, stress, and sleep disturbance. According to these authors, "the similarity between the symptoms of noise annoyance and those of 'wind turbine syndrome' indicates that this 'diagnosis' is not a pathophysiological effect, but is an example of the well-known stress effects of exposure to noise, as displayed by a small proportion of the population." Cited in Ex. 76 (Punch and James 2016).

One need not invoke pathophysiological effects to understand that health harms result from noise-induced stress including, but not limited to, stress that causes sleep disturbance. McCunney's opinions rely in part on confusing cause and effect, since it is obvious that noise complaints reflect annoyance and annoyance can cause stress and lead to additional health harms. Pre-existing stress may make one more sensitive to intruding noise, and thus more likely to complain. However, this is unremarkable, since it can be anticipated that any population will have members with pre-existing stress. The applicant's experts point to no information indicating that prevalence of stress and thus

heightened sensitivity to noise is unique to the community in the project area.

As previously noted, new medical data prompted the WHO to issue Night Noise Guidelines to supplement the organization's 1999 Noise Guidelines for Europe. Based on the new data, the WHO recommends limiting noise to 40 LAmax to protect the public from harm. Thus a 45 dBA Leq over the nighttime, the project design goal chosen by Cassadaga Wind, is not responsive to the new medical data. The applicant's emphasis is instead on "hearing loss", (Tr. 1505:14-16), an issue raised by no party to this proceeding. None of the parties contend there is any risk of hearing loss that would result from exposure to wind turbine noise generated by this project.

The Department of Health testimony

Henry Spliethoff for the New York State Department of Health ("DOH") testified that he has "reviewed and broadly characterized information related to health risks associated with energy use and production ranging from atmospheric pollution, to non-ionizing radiation, to occupational accidents", (Tr. 1476:4-7), and he conducts "programmatic oversight of the Department's participation in the Article 10 application review process", (Tr. 1476:18-19), but Mr. Spliethoff did not indicate he has previously reviewed risks associated with wind energy projects. His testimony is limited to "an overview of health protective audible noise guidelines and their applicability to wind facilities including the proposed Cassadaga Wind LLC facility". Tr. 1477:4-6. Nevertheless, Mr. Spliethoff concludes that "the operation of the Cassadaga facility as proposed could result in potential health impacts associated with noise levels in excess of appropriate guidelines for a subset of receptors, in the absence of additional imposed certificate conditions." Tr. 1477:16-19.

Concerned Citizens' acoustic and health experts provided a wider scope of testimony, including the potential adverse effects of inaudible infrasound and air-borne vibrations generated by wind energy projects. However, within the scope of Mr. Spliethoff's testimony there is broad agreement. Specifically, Concerned Citizens agrees that:

1) "noise induced stress reaction" can be caused by exposure to wind turbine noise (Tr. 1479:6);

2) "higher levels of noise can be associated with cardiovascular effects and speech interference, while lower levels can have effects such as annoyance and sleep disturbance" (Tr. 1479:8-10);

3) "noise impacts [should] be kept below levels understood to be potentially harmful to health" (Tr. 1479:12-13);

4) noise-induced sleep disturbance is "a health problem in and of itself" (Tr. 1482:5);

5) compared to older guidelines addressing long-term exposure to environmental noise, the WHO in 2009 finds that at lower levels "biological effects of noise during sleep includ[e] increases in heart rate, arousals, sleep stage changes and awakening, as well as self-reported sleep disturbance, increase in medicine use, increase in body movements, and noise-induced sleep disturbance". (Tr. 1479:10-12, 1482:1-4);

6) World Health Organization guidelines issued in 1999 and 2009 "provide appropriate guidelines to assess the potential public health impacts of audible noise such as that produced by proposed wind farm projects" (Tr. 1478:1-6); and

7) the absence of a design goal for noise exposure for "participating" residents, i.e., "residences stand to benefit financially from the siting of turbines", is an issue

because this project "should have some limit to protect the health of those living in these residences". Tr. 1487:6-8. We go farther than DOH in calling for an appropriate design goal to be applied without regard to the wind industry distinction between "participants" and "non-participants". In the context of health, we see no basis in law or policy for such a distinction. *See further below.*

However, it is important to note that the WHO and the acoustic experts for both Concerned Citizens and DPS agree that annual average metrics and noise descriptors are not meaningful when evaluating the potential for low level wind turbine noise to cause sleep disturbance, because sleep is disturbed by sound events. As noted above, WHO's guidelines specifically reject reliance on an average sound level exposure to determine health-protective noise limits, and recommends instead that the number of "sound events" that could result in sleep disturbance be evaluated. Reliance by DOH on a 40 dBA (night) annual average to protect against adverse health effects of wind turbine noise fails to address the impact of sound events that disturb sleep.

DOH also believes that "[a]lthough noise from turbines may have certain distinctive qualities (e.g., amplitude modulation, tonality), there is currently not enough evidence to determine whether or how much these qualities could result in health-related impacts above and beyond that from the noise level alone." Tr. 1479:13-17. However, community noise assessment methods commonly penalize low frequency and pulsating components of noise, when present, to reflect the greater potential for annoyance. *See* Tr. 1619:13-21 (Punch); Tr. 2258:1-19 (Moreno-Caballero, recommending a 5 dB penalty if the depth of amplitude modulation is ≥10 dB); Tr. 2273:3-9 (Moreno-Caballero, recommending another 5 dB penalty for prominent tones). If noise-induced annoyance is clearly linked to adverse health effects, as the WHO and others have concluded, the

question of whether the distinctive qualities of wind turbine noise could result in health-related impacts above and beyond what would be expected from a conventional A-weighted, time-averaged sound level alone has been answered in the affirmative. How much more harmful those qualities of the noise are is answered by penalties added to modeled A-weighted, time-averaged sound level results.

Given DOH's emphasis on WHO's guidelines, it is important to understand that WHO (2009) makes a clear distinction, based on health concerns, between an annual average sound level that is generally protective against the effects of higher levels of exposure, such as cardiovascular impairment, from the effects of lower levels of exposure that occur during "sound events" that cannot be evaluated by means of annual average sound levels. Mr. Spliethoff's testimony obscures this important distinction.

According to Mr. Spliethoff, "Health impacts may occur at lower levels over longer exposures (e.g., averaged over a year) than those that occur over shorter exposures (e.g., over a single night)." This is not consistent with the WHO guidelines. WHO links long-term average sound levels to cardiovascular dysfunction, but that is not the concern here. *See* Tr. 1650:11 to 1651:5 (Punch). Compared to average sound levels, "when it comes to long-term protection [against sleep disturbance], the number of events is equally important. The possibility of predicting after-effects like sleepiness, reaction time, sleeping pill use and health complaints, in particular, requires a combination of a number of events and their level instead of just the average LAmax or average SEL [sound exposure level]." Ex. 67 (WHO 2009 Night Noise Guidelines), at 7-8. *See also id.*, 8, Fig. 1.6 (graphic depicting the difference between annual average (Lnight) and Lmax sound levels), and *id.*, text at 8 ("the Lnight is the average over all nights in one year"). *See also* Tr. 1479:8-10, 1484:14 to 1485:3 (Spliethoff) ("higher levels of noise can

be associated with cardiovascular effects and speech interference, while lower levels can have effects such as annoyance and sleep disturbance. . . . most recent assessments of environmental noise exposure are in general agreement that annoyance and/or sleep disturbance due to nighttime noise levels are the more sensitive end points from exposure to relatively low levels (up to about 50 dBA) of environmental noise.").

Proposed Noise Reduction Operations

Based on the applicant's ISO 9613-2 model results, a substantial number of homes in the Study Area would be exposed to noise levels that exceed the applicant's design goal. Accordingly, the applicant has proposed "Noise Reduction Operations" (NROs), consisting of altering the pitch of blades and perhaps utilizing serrated wind turbine blades, if available on the models ultimately selected for operations.

NROs should not be considered effective mitigation because there are no enforceable conditions to require NROs under specified operations conditions. The applicant has proposed that a "schedule" of NROs for individual turbines be kept by the Applicant but notes this information would not be available to DPS or the public: "NRO is not typically logged through the SCADA [Supervisory Control & Data Acquisition] system,[11] but instead is part of a schedule that is programmed into a turbine." Ex. 25

11 According to NYSERDA:

> SCADA is a well-established technology for network management that has been deployed by utilities for more than thirty years to provide improved automation and control in the transmission system and at substations. SCADA consists of data acquisition (i.e., sensing and communications), data processing, remote control of mechanical devices (i.e., switches), event processing and other data analysis functions required to support the automated operation of a system.
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> NYSERDA, *Microgrids: An Assessment of the Value, Opportunities and Barriers to Deployment in New York State, Final Report 10-35* (September 2010), 18,

(Applicant's proposed Certificate Conditions), at 20 (note to proposed Cond. 84).

Model confidence (or error) levels

The applicant's acoustic consultant testified that IEC 61400-11 is an industry standard utilized as "the foundation for . . . the modeling that we do." Tr. 2106:24 to 2107:3. However, IEC 61400-14 requires addition of 2 dB to the sound level generated by one wind turbine measured under IEC 61400-11 to account for "a batch of turbines" operating at once. Tr. 2409-2410 (Moreno-Caballero). This 2 dB adjustment is not sufficiently conservative because both IEC 61400 standards report the results of "near field" sound. Residents and other sensitive receptors within the Study Area would be exposed to "far field" impacts that occur several times that distance from the noise source. *Cf.* Tr. 2101:22 to 2106:20. Accordingly, those predictions cannot be accurate to the same ± 2 dBA confidence level as the IEC "batch of turbines" near field measurements.

Nothing in the IEC 61400-11 standard indicates that the apparent sound power level should be utilized as an input to a long distance predictive model. As indicated in the introduction to the standard, the purpose of the method for obtaining an apparent sound power level is to achieve repeatability among tested turbine types, not modeling noise impacts. If all declared apparent sound power levels are determined using the same protocol, apparent sound power levels can be confidently compared across turbine types. However, this says nothing about the use of apparent sound power levels for other purposes. The standard does not authorize the use such data for other purposes, and

available at: <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Electic-Power-Delivery/microgrids-value-opportunities-barriers.pdf>.

provides no guidance on how to use the declared apparent sound power level in a modeling protocol.

Thus, Mr. Kaliski's assertion that the ISO 9613-2 model ± 3dBA uncertainty need not be adopted for his model because he used the IEC 61400-11 confidence limits has no basis.

The ISO 9613-2 standard applies to propagating the sound generated by a point source. However, IEC 61400 standard results should be utilized as an input to the ISO 9613-2 model. Within the distance of the two blade lengths (about 125 meters) where the IEC 61400-11 standard measures wind turbine noise, the noise source is an area source and does not behave as the ISO 9613-2 standard assumes. *See* Tr. 71:11-14 (Kaliski, agreeing that within two blade lengths wind turbines act like an area source, and citing Ex. 138 (Makarewicz (2011)). Accordingly, the ISO 9613-2 model ± 3dBA uncertainty is not sufficiently conservative.

By its terms the accuracy of the ISO-9613-2 model is ±3 dB for broadband noise sources elevated more than 30 meters above receptors, but provides no tolerance for accuracy beyond that limit. *See* Ex. 126 (ISO-91613-2, Table 5). *Cf.* Tr. 2039:4 to 2044:9. Nor does ISO-9613-2 authorize application of a factor for discounting modeled sound levels at distance due to ground absorption of the sound when noise source exceeds "a mean propagation height of thirty meters". Tr. 2031:9*ff.* The stated confidence limits for the model results are accordingly insufficiently conservative for wind turbine noise.

The ISO 9316-2 model itself was developed more than a decade after the CONCAWE meteorological adjustment model, provides its own adjustments for ground attenuation and weather conditions, and does not adopt or incorporate CONCAWE. Mr. Kasliski's tailored-made model combining the two protocols is not authorized by either,

and is offered based on no more than "industry standards", *i.e.*, the principle that because the industry favors this approach it should be adopted by regulatory agencies and the public. The predictive methods employed by Mr. Kaliski do not comply with generally accepted standards and are novel.

The ISO 9316-2 model also assumes calm surface winds. Results of running the model for the Cassadaga Wind project (albeit without identifying its level of uncertainty) are presented in Table 28 of the applicant's sound study. Applic., Appx. Z. The project sound levels are reported there as mean (Leq) levels and represent the sound propagation during a period with calm surface winds. The ISO 9316-2 model does not specify that the predicted value is an Leq 1-hour, or an Leq 8-hr. Rather, the model specifies that the predicted value is an Leq over a short period of time for the specified weather conditions.

As previously discussed, an Leq sound level is not appropriate for evaluating the potential for sleep disturbance because sleep disturbance is caused by sound events, not mean sound levels over time. For that, the WHO recommends that an Lmax sound level is more effective, since it is able to evaluate the frequency of sound events that would be anticipated to effect the ability to sleep.

Together with the degrees of uncertainty in the model results for this project, it cannot be said that the chosen design goal is conservative. *Cf.* 2403:19-21 (Moreno-Caballero, applicant's modeling study is insufficiently conservative).

<u>The applicant's sound model results show many people would be exposed to unhealthy levels of noise</u>

Based on its own modeling efforts, the applicant reports that operational hourly mean sound levels (Leq) utilizing NROs would expose 232 residents and other sensitive

receptors to A-weighted sound levels of 40 dB or higher. Applic. Ex. 19, at 36, Table 19-10 (adding number of receptors reported exposed to 1-hour LEQ - dBA). *See also* Tr. 2232:5-7, 2235:20-22 (Moreno-Caballero, finding that "186 [identified receptors] are expected to have sound levels greater than 40 dBA" when noise reduction operations are implemented, and concluding that a "relatively high number of receptors [is] expected to be exposed to noise levels above 40 dBA"). This information should be evaluated in light of the WHO's recommendation to limit noise to 30 dB LAeq over the eight-hour nighttime period, and "still lower . . . when the background level is low." Ex. 67 (WHO 2009), at 40. The applicant's acoustic expert misinterpreted the WHO (2009) guidelines in this regard, contending that for wind turbine noise, WHO's long-term limit to protect against cardiovascular dysfunction is the proper guideline. Tr. 1920:11 to 1921:2 (Kaliski).

The applicant's noise exposure prediction should also be evaluated in light of the fact that, discussed previously, A-weighted measurements are not an adequate indicator of exposure in this case, because the A-weighted noise descriptor filters out most low frequency noise, all infrasound, and all pulsation.

The applicant's noise exposure prediction should also be evaluated in light of the fact that "the local law restrictions applicable to this Project, are based on short term maximum noise levels not on long term mean or average noise levels." Tr. 2197:12-15 (Moreno-Caballero).

The applicant's noise exposure prediction should also be evaluated in light of the conditions the Commission imposed on the Athens power power plant. "Acoustic design goals were [approved] between 40 and 41 dBA for locations with pre-construction ambient noise levels between 37.8 and 39.5 dBA." Tr. 2238:10-12 (Moreno-Caballero).

In other approved power plants, the Commission has required "design goals [that] were 41 dBA or lower for locations that had pre-construction ambient levels lower than 40 dBA, and only greater than 41 dBA for locations with pre-construction levels higher than 40 dBA." Tr. 2239:18-22.

The applicant improperly seeks a waiver from protections for project "participants"

According to the Applicant, "most, if not all, wind project agreements in New York include some variation of the setback waiver and/or noise restrictions for participating landowners." Tr. 927:9-11. On this ground, the Applicant asks for approval for a waiver of health and safety protections for project "participants". "A participating property is one where there the owner has signed contractual agreement with the Applicant. As opposed to a non-participating property where there are no such agreements with the Applicant." Tr. 2219:16-20 (Moreno-Caballero). The Applicant proposes to treat "good neighbor properties, [whose owners] may receive compensation but not sign an easement", the same as "participating" homes. Tr. 2250:11-19 ("This recommendation is reflected in Certificate Condition 79(e)(v).").

Publicly recorded memoranda of such agreements obtained from the Chautauqua County Clerk are provided herewith. One identifies a lease and easement agreement betweeen Cassadaga Wind, LLC and David and Christine Lind regarding 140 acres in Charlotte, New York, and specifically Cassadaga Wind's "use the Property for wind energy purposes". Lind Memo of Lease, 3, ¶1. The other identifies a lease and easement agreement betweeen Cassadaga Wind, LLC and Merle Goot, Jr., regarding 102.5 acres in Charlotte, New York, adjacent to which Cassadaga Wind would install wind turbines. Goot Memo of Lease, 2. This latter agreement appears to be an example of the "good

neighbor" agreement identified above.

The terms of these agreements purport to "waive those Setback Restrictions and Noise Limitations" that would be "imposed by any local . . . laws, regulations and/or governmental approvals", (Lind Memo of Lease, 3-4, ¶5), or to "waive[] any all setbacks and setback requirements to [Mr. Goot's] common boundary, whether imposed by applicable law or by any person or entity." Goot Memo of Lease, 2. The Lind agreement purports to operate in perpetuity, (id., 4, ¶7 ("shall run with the land")), and therefore deprives the grantor of procedural protections against off-site harms that affect them and their land. To the extent that any adverse impacts of operating wind turbines on the Linds' land affects neighboring landowners, the neighbors' ability to utilize procedural protections against off-site harms that affect them and their land may also be diminished. Were the terms of these agreements accepted as conditions to a Commission order in this case, that would effectively remove the "participating" properties from the requirements of local substantive land use requirements and the Commission's jurisdiction.

If the practice of evading local and state requirements through contract were permitted, any Article 10 application could be transformed into a matter of private contract and removed from the public process mandated by Article 10. The result would be a checkerboard of parcels in the host towns comprising islands of noncompliance with otherwise generally applicable land use rules mandated either by the towns or by the Commission. These islands would not be subject to any future zoning, Commission restrictions on land use, or other governmental land use restrictions inconsistent with the manner in which applicant wishes to operate the project. *See* Lind agreement, 3, ¶4 (prohibiting the grantor from interfering with "the siting [or] permitting" of the project).

In addition, whether these were "arm's length" agreements, (Tr. 927:3-4), with

sufficiently informed landowners is questionable. Promises, stipulations and representations were presumably made by the applicant to potential "participants" well before being tested in this proceeding. If the Commission determines that such assertions not only doused potential flames of opposition (noting that only one small group intervened late in this matter), but were also demonstrably false (in light of an analysis of the testimony of the parties), approval of the project as proposed would amount to approval of deceit and misleading conduct. For example, should complaints from the project's low frequency noise impacts, including infrasound (which the applicant consistently asserts cannot result from the project), follow the commencement of operations, the misleading of an aggrieved landowner (however she may be classified) to her detriment can be equated to fraud. The harm to "participants" would be arguably especially egregious since their right to be heard is arguably removed by the terms of their agreement, which prohibits interference with operations and thus may not allow the "participant" to utilize approved procedures to resolve complaints with the applicant.

Other state siting officials have struggled with the wind industry's effort to apply different substantive standards for siting their facilities for landowners who lease land for the facility or provide an easement for facility components. For example, the Maryland Public Service Commission issued a decision in the matter of Dan's Mountain Wind Force, LLC, for a Certificate of Public Convenience and Necessity, concluding that "requiring compliance with the setback and separation distances in the WECS Ordinance for those property owners that are willing to agree to live in close proximity to a turbine is not reasonable."[12] However, the ALJ's decision (affirmed by the full Maryland PSC)

12 Maryland PSC, Case 9413, *In the Matter of the Application of Dan's Mountain Wind Force, LLC for a Certificate of Public Convenience and Necessity to Construct a 59.5 MW Wind Energy Generating Facility in Allegany County,*

determined that separate setbacks from wind turbines for "Participating Properties" would be appropriate because "the Participating Property Owners have the choice, once the Wind Project is operational, to sell the property on which the residence is located to the Applicant without requiring any basis for the election."[13] There is no indication of such a provision in the Lind or Goot memoranda of lease and easement agreements.

In a utility rate case, the Pennsylvania Supreme Court held that where private contractual rights are in conflict with the provisions of a tariff, the the state Public Service Commission is authorized to modify the provisions of the contract.[14] That court reasoned:

> Where parties enter into a contract which relates to a matter which may subsequently be the subject of revision by the State in the exercise of its police power, their contracts, whether definite or indefinite in point of time, must be held subject to the right of the State to act in regard thereto. They cannot allege that the contracts, so far as the State is concerned, are inviolable. It is not, as we have already pointed out, because of the interest of the parties to the contract, or either of them, that it may be revised or modified, but because of the greater good resulting to the public at large.[15]

To the extent that the New York PSC issues certificates of public convenience and necessity in exercise of the police power, where it conflicts with that exercise of power

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Maryland, Proposed Order of the Public Utility Law Judge (January 25, 2017), 56, affirmed by Maryland PSC, Order No. 88260 (June 16, 2017), both available at <http://www.psc.state.md.us/electricity/> (search on Case Docket No. 9413).

13 *Id.*, 57.

14 *Leiper v. The Baltimore & Philadelphia Railroad Company,* 105 A. 551, 262 Pa. 328, 1918 Pa. LEXIS 646 (1913).

15 105 A. at 554, 262 Pa. at 335, 1918 Pa. LEXIS 646 at *12-13.

freedom to contract must yield. "Real liberty for all could not exist under the operation of a principle which recognizes the right of each individual person to use his own, whether in respect of his person or his property, regardless of the injury that may be done to others."[16] "[I]n every well-ordered society, charged with the duty of conserving the safety of its members, the rights of the individual in respect of his liberty may, at times, under the pressure of great dangers, be subjected to such restraint, to be enforced by reasonable regulations, as the safety of the general public may demand."[17]

A Pennsylvania appellate court recently upheld the authority of a county Zoning Hearing Board (ZHB) to disregard a wind project applicant's request that it observe the distinction between height and setback requirements applicable to "participants" and "non-participants" in the project, respectively.[18] The trial court had ruled in favor of the applicant on the issue of whether safety setbacks to protect against the risk of ice throw can be varied for project "participants". The applicant argued that the variance standard, whether varying the applicability of setbacks in this way would avoid a "detriment[] to the public welfare", was met because the landowners affected could not be harmed by virtue of their participation in the project. The trial court agreed, reasoning:

> All of the variances requested are from "property lines" shared with other participating/consenting wind farm participants. As noted above, there is no public benefit to setbacks measured from the line of a consenting landowner. The landowners at issue have granted their private property rights to PPM.

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16 *Jacobson v. Massachusetts*, 197 U.S. 11, 26, 25 S. Ct. 358, 361, 1905 U.S. LEXIS 1232, *28 (1905).

17 *Id.*, 197 U.S. at 29.

18 *PPM Atlantic Renewable v. Fayette County Zoning Hearing Board*, 93 A.3d 536, 2014 Pa. Commw. Unpub. LEXIS 311 (Pa. Commw. Ct. 2014).

The ZHB denial only protects "victims" that do not exist.[19]

Accordingly, the trial court modified the ZBH's condition by limiting setbacks to non-participants.

The appellate court reversed on this issue, crediting the appellant (non-participating) landowner's argument that it was improper for the trial court "to allow private individuals (those that are participating in Applicant's project by leasing their land for that purpose) to waive government zoning requirements. If that were deemed proper, Objector argues, there would be no need for zoning regulations."[20] The appellate court held that the trial court lacked authority to waive applicability of land use restrictions meant to protect health, safety and welfare:

> As for the trial court's rationale in modifying the condition (that the increased setbacks should not apply to landowners who are "participants" in the project), the trial court cites no authority that allows a court to waive a validly attached condition on this basis, and we are not aware of any authority that would allow the trial court to modify the condition on this basis.[21]

The appellate court also considered the appellant's argument that the trial court "improperly gave individual citizens the right to waive zoning requirements" based on "the fact that 'all of the adjoining landowners specifically consent to the wind farm use.'"[22] The appellate court agreed, crediting the appellant objector's argument that "the

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19 2014 Pa. Commw. Unpub. LEXIS 311, at *24-25 (transcript citation omitted).

20 2014 Pa. Commw. Unpub. LEXIS 311, at *16.

21 2014 Pa. Commw. Unpub. LEXIS 311, at *36.

22 2014 Pa. Commw. Unpub. LEXIS 311, at *38-39 (quoting the trial court

salient fact here is that Applicant proposes to construct a wind power facility on land it does not own; rather, all the land is leased. Objector argues all the property owners leased their land for a guaranteed financial return if the project is approved. Thus, Objector contends, it is obvious why these landowners would waive any setback violations. Objector asserts that, although zoning laws are to be construed so as to allow the broadest use of land, a court cannot allow private individuals to waive the need for zoning variances."[23] Accordingly, the appellate court upheld the ZHB's denial of a variance as to project participants, based on a finding that "[the] Applicant did not prove the grant of the variances would not harm the public welfare based on the risk of ice throws from the wind turbine blades."[24]

On further appeal, the Pennsylvania Supreme Court declined to disturb the appellate court's conclusions on the propriety of distinguishing participants from non-participants when regulating land use for the public's health, safety and welfare.

The legal distinction between project "participants" and "non-participants" is no more than an industry construct. It has no basis in law or policy. More importantly, private citizens are not authorized by law to waive safety- and health-based regulations that are otherwise generally applicable. The Commission should be urged not to authorize this questionable effort to control the applicability of its restrictions, at least as regard health and safety protections.

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decision).

23 2014 Pa. Commw. Unpub. LEXIS 311, at *40.

24 2014 Pa. Commw. Unpub. LEXIS 311, at *53.

Conclusion

The annualized noise model produced by the applicant fails to address the specific concerns about health harms of wind turbine noise that have been the subject of substantial research and debate for several years. Worse, the applicant's analytical approach to assessing and mitigating noise anticipated from its proposed project denies these are concerns, and contends that actual complaints at other wind projects have psychogenic rhather than real causes. Its own noise modeling efforts fail to provide information sufficient to support a finding that the project as proposed would avoid or minimize serious health impacts in the community. In fact, the results of the applicant's modeling shows it would not meet its own design goal, which itself fails to protect public health according to generally accepted guidelines issued by the WHO. The applicant's effort to waive its chosen 45 dBA Leq (annual) design goal for "participants" in the project has no basis in law or policy, and would subject persons living at such properties to health risks they cannot be expected to know about or understand.

Since the Applicant has not proposed an effective, transparent and feasible protocol for utilization of Noise Reduction Operations as a mitigation for excessive noise, and DPS has not offered to receive and review the schedule or the data that would be generated by individual turbine programs managing NROs, NROs cannot be relied on to mitigate excessive noise. Accordingly, there is no basis on which the Commission could rely on NROs for mitigation. The Commission should therefore disregard NROs in its evaluation of whether the application supports the findings required by Article 10.

Dated: September 8, 2017

Respectfully submitted,

/s/

Gary A. Abraham
Attorney for Intervenor CCCWP

29.B. PROPOSED FINDINGS

The following findings are proposed:

1. The benefits of the Proposed Project are:

a. A temporary, short-term economic benefit to the County and State accruing from the construction and operation of the Project and an insignificant net economic benefit to the County and the State during the useful life of the Project in the form of added jobs.

b. A potential but small contribution toward the State's attainment of its renewable energy portfolio standard by 2022.

2. Subject to the applicable recommended certificate conditions, the Proposed Project will have no adverse permanent impact on aviation safety, potable water supplies, electromagnetic interference, transportation, historic and cultural resources, disposal of waste, and the stability and reliability of the electric system.

3. The certificate condition requiring a decommissioning plan and associated bond will protect the County residents from any costs associated with removing the wind turbines in the event the Applicant or applicable land owners fail to do so at the end of the Proposed Project's useful life or abandonment of the Project. However, while these factors do not weigh against the grant of a certificate, none may be considered a benefit of the Wind Project.

4. The Proposed Project will have adverse impacts on recreational resources, principally a developed and growing trail system in and around state-owned forest lands.

5. The Proposed Project will have adverse impacts on the esthetics of the local communities in and around the proposed project area.

6. The adverse impact caused to the comfort of nearby residents by the noise produced and the shadow flicker perceived will not be fully mitigated by incorporating conditions into a certificate.

7. Weighing the benefits against the adverse impacts that are unable to be mitigated by incorporating conditions into the certificate, the benefits that may accrue to the public at large by construction of the Proposed Project do not justify or offset subjecting the local community to the adverse impacts that will result from the Project's construction and operation.