BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

DOCKET PU-19-028

IN THE MATTER OF THE APPLICATION BY RUSO WIND PARTNERS, LLC FOR A PERMIT OF A WIND ENERGY FACILITY IN WARD COUNTY, NORTH DAKOTA, FOR THE RUSO WIND PROJECT

Direct Testimony of David M Hessler
On Behalf of the Staff of the North Dakota Public Service Commission
May 28, 2019

Q. Please state your name and business address.

A. My name is David M. Hessler. The address of my company's administrative offices is 38329 Old Mill Way, Ocean View, Delaware 19970, and my personal office is located at 5096 N Silver Cloud Dr., St. George, Utah 84770.

Q. Mr. Hessler, by whom are you employed and in what capacity?

A. I have been employed for over 28 years by Hessler Associates, Inc., as Vice President and a Principal Consultant. Hessler Associates, Inc. is a family run engineering consulting firm that specializes in the acoustical design and analysis of power generation and industrial facilities of all kinds, including wind energy projects.

Q. Please describe your educational background and your professional experience?

A. I received a Bachelor of Science degree in Mechanical Engineering in 1997, *Summa cum Laude*, from the A. James Clark School of Engineering, University of Maryland, College Park, Maryland, and a Bachelor of Arts degree, 1982, from the University of Hartford, Hartford, Connecticut. I am a registered Professional Engineer (P.E.) in the Commonwealth of Virginia and I am a member of the Institute of Noise Control Engineering (INCE). My professional specialization is the measurement, analysis, control and prediction of noise from both fossil fueled and renewable power generation facilities. I have been the principal acoustical designer and/or test engineer on hundreds of power station projects all over the

world and on roughly 70 industrial scale wind energy projects. I wrote the chapter on measuring and analyzing wind turbine noise in the book "Wind Turbine Noise"[1], which was published in 2011. I also drafted a set of best practices guidelines[2] for siting new wind turbine projects and testing them once completed for the National Association of Regulatory Utility Commissioners (NARUC). My resume, which contains a list of the cases where I have testified as an expert witness, is also attached for reference as Exhibit DMH-1.

Q. What is the purpose of your testimony in this case?

A. I have been asked by the Staff of the North Dakota Public Service Commission (PSC) to independently review and evaluate the adequacy of the noise assessment study carried out by Burns & McDonnell Engineering Company, Inc. in support of the Ruso Wind Project.

Q. What materials have you reviewed in this matter?

A. I have reviewed Section 6.5 "Sound" of the Application for a Certificate of Site Compatibility submitted by Southern Power in December of 2018 and Appendix R of that document that contains the sound study for the project prepared by Burns & McDonnell Engineering Company, Inc. I have also received a data request response from the Applicant to Staff dated May 2019 delineating the participation status of residences in the project area.

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[1] Bowdler, D., and Leventhall, G., Editors, "Wind Turbine Noise", Multi-Science Publishing Company, Brentwood, Essex, UK, 2011.

[2] Hessler, D., "Assessing Potential Impacts from Proposed Wind Farms & Measuring the Performance of Completed Projects", National Association of Regulatory Utility Commissioners, U.S. Department of Energy, October 2011.

Q. Can you please summarize your overall opinion of the sound study submitted on behalf of the project?

A. In general, the study is well done and I completely agree with the modeling methodology and all of the assumptions that went into the sound contour mapping. However, I would fault the study for focusing exclusively on regulatory compliance and for not making any effort to evaluate or assess the potential noise impact of the project on the community. For example, it is common, but by no means universal, industry practice to perform a baseline sound survey of existing conditions within the site area and then compare the expected project sound levels at residences to this pre-existing sound level. The amount by which the project sound level exceeds the background level generally determines the project's perceptibility and potential impact and it is good practice to attempt to minimize this differential. A 5 dBA increase is often used as an ideal design goal because it limits the prominence and audibility of the project relative to the background level. Such a relative, ambient-based approach can, and often does, lead to an ideal design target that is lower than the applicable absolute regulatory limit(s).

Q. Does that mean you believe a survey should have been done?

A. A survey and a subsequent impact analysis, while not absolutely essential in all cases, would have demonstrated a concern for the community's welfare and acceptance of the project. As it is, no thought appears to have been given to

residents in the area; particularly non-participants who are not receiving any kind of benefit from the project. It is in everyone's best interest, including the project owner/operator, to minimize the potential for noise issues.

Q. Be that as it may, do you believe the project will at least meet all the applicable regulatory limit?

A. Yes, but not by much in some cases. The State of North Dakota limits the sound emissions from wind energy facilities to 50 dBA within 100 ft. of an inhabited residence. The maximum predicted sound level at any residence is 49.3 dBA. It is should be noted that this residence, identified as Rec-53, is a non-participant.

Q. Is compliance with regulatory noise limits all that matters for projects like this or could the Applicant have done more to evaluate and mitigate the potential noise impact of the project?

A. Compliance with regulatory limits is a foregone conclusion. No one would think of submitting an application that did not demonstrate that the project's sound emissions would meet the applicable limits. Beyond a mere compliance assessment, what I would have preferred to see is (at least) an effort on the Applicant's part to minimize the potential noise impact of the project, irrespective of the regulatory limit, especially with regard to non-participating residences. In this instance, the four residences with the highest predicted sound levels, ranging from 47.0 to 49.3 dBA, are all non-participants (Receptors 26, 48, 52 and 53).

Q. What, specifically, might have been done?

A. In my experience doing noise impact assessments for new wind projects it is common practice to do iterative optimization modeling where a proposed layout is evaluated early in the design process for opportunities to reduce the sound levels at potentially sensitive receptors, particularly at non-participants within the project area. This modeling generally involves relocating or eliminating units that are causing sound levels in excess of 45 dBA or, ideally, 40 dBA if such a level is within practical reach. I find that if a project's sound emissions can be kept below those thresholds it substantially reduces the possibility of complaints and community disturbance, which seems like something the project owner would want. In addition, designing for lower sound levels at residences normally creates a larger safety factor with respect to regulatory compliance. For example, as things currently stand, this project only has a very slim 0.7 dB design margin at Receptor 53 – at the house itself, or a mere 0.4 dB at the 100 ft. regulatory test location.

Q. Apart from altering the layout by moving or eliminating units early in the design process, are there any other options that the Applicant might have pursued or still can pursue?

A. Yes. In this instance 13 of the 66 proposed turbine sites are designated as alternates. Primary (non-alternate) units that are close to residences could be moved to alternate sites further from homes. As an example, Turbine T11, which is fairly close to a house, could presumably be moved a short distance south to

the neighboring Alt-03 site substantially reducing the sound level at that residence. Conversely, alternate sites that are fairly close to homes should not be used, such Alt-04 and Alt-05 near the center of the project area, which have a house between them.

Q. Is there anything else that the Applicant could have pursued to lower the project sound levels at residences?

A. Yes. In lieu of, or in addition to, relocating any units to alternate sites, some of the closest units to residences could be operated in low noise mode (also known as noise reduced operation (NRO)), if not all of the time, at least at night when sensitivity to noise is much greater. To my knowledge, the blade pitch in any new turbine model can be programmed and controlled so that the unit produces less aerodynamic noise – albeit at the expense of electrical output. A reduction of up to 5 dBA is normally attainable with this approach, which would be a clearly discernable reduction in noise.

Q. Is there anything else that the Applicant could have done to lessen the potential noise impact of the project?

A. Yes. Certain turbine manufacturers offer low noise trailing edge (LNTE) blades that reduce aerodynamic noise on a permanent basis without, I believe, any significant reduction in electrical output. This possibility should have been looked into, at the very least for units close to residences.

Q. You alluded earlier to design thresholds of 45 and 40 dBA. Do you think this project could achieve either of those targets at all residences?

A. With the various noise mitigation options mentioned above I think it's conceivable that a level of 45 dBA could be managed, since there are only 6 receptors above that conservatively assuming all 66 sites are built on as opposed to the 53 planned units. A sound level of 40 dBA looks like it would be a stretch, but I believe an effort should have, and could have been made here, to get the sound levels down to as low a number as possible. The fact that the four highest predicted sound levels are all at non-participants is unusual in and of itself and demonstrates an apparent lack of concern on the Applicant's part for the welfare of the community.

Q. If the Applicant produced an optimized sound contour plot based on the 53 unit layout showing that a sound level of 45 dBA or, preferably, less could be achieved at all residences, accompanied by an assurance to build the project in accordance with that layout, would you recommend that the Commission approve the project?

A. Yes. Such a commitment would go a long way towards making the project more compatible with community. The current 66 site arrangement leaves open the possibility that sound levels as high as 48 and 49 dBA could occur at non-participating residences, which is highly undesirable. While those levels are compliant with the regulatory limit, it appears that reasonable mitigation measures could still be implemented without seriously compromising the

economics of the project to significantly reduce those levels and minimize the potential noise impact of the project.

Q. Does this conclude your testimony?

A. Yes.