

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION BY ENGIE NORTH AMERICA, INC. FOR  
A PERMIT FOR A WIND ENERGY FACILITY IN HUGHES AND HYDE COUNTIES,  
SOUTH DAKOTA, FOR NORTH BEND WIND PROJECT**

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PRE-FILED DIRECT TESTIMONY OF TED GUERTIN, TETRA TECH, ON BEHALF OF  
ENGIE NORTH AMERICA, INC.

June 11, 2021

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1 **Q. Please state your name, employer and business address for the record.**

2 A. My name is Ted W. Guertin and I am Senior Air Quality Meteorologist with Tetra Tech,  
3 Inc (“Tetra Tech”). My business address is 3 Lan Drive, Suite 100, Westford, MA 01886.

4 **Q. Briefly describe your educational background.**

5 A. I have an MS in Atmospheric Science from the University of New York at Albany where  
6 I graduated in 1989. I also have a Bachelor of Science Degree in in Atmospheric Science from  
7 the University of New York at Albany where I graduated in 1986.

8 **Q. Briefly describe your professional experience.**

9 A. I have over 32 years of consulting experience. My experience includes environmental  
10 licensing, shadow flicker analyses, wind power related visual assessments, wind resource  
11 assessments, dispersion modeling, air toxic assessments, air quality permitting and monitoring,  
12 and preparation of technical reports to support environmental impact review. I have extensive  
13 experience utilizing a wide range of models, including the use of the WindPro software for analysis  
14 of shadow flicker, zone of visual impact (“ZVI”), wind farm photo simulations, and initial wind  
15 resource evaluation. I have also served as a testifying expert witness and have prepared technical  
16 documentation in support of testifying expert witnesses.

17 **Q. Have you attached a resume or CV.**

18 A. Yes, my resume is attached.

19 **Q. Have you previously submitted or prepared testimony in this proceeding in South  
20 Dakota?**

21 A. No, I have not.

22 **Q. What is the purpose of your direct testimony?**

23 A. The purpose of my direct testimony is to discuss the modeling the Project used to  
24 determine anticipated locations and effects of shadow flicker, and to discuss the mitigation  
25 measures which will be implemented in constructing and operating the project.

26 **Q. Which sections of the application are you responsible for?**

27 A. I am responsible for Section 11.5 on Shadow Flicker.

28 **Q. What is shadow flicker?**

29 A. A wind turbine's moving blades can cast a moving shadow on locations within a certain  
30 distance of a turbine. These moving shadows can create a temporary phenomenon called shadow  
31 flicker experienced at nearby residences or public gathering places.

32 **Q. Is shadow flicker regulated at the local level?**

33 A. Hyde County Zoning Ordinance Section 9-104.A.20 establishes that flicker at any  
34 receptor shall not exceed 30 hours per year within an established dwelling and 40 hours per year  
35 from any occupied structure. There are no shadow flicker restrictions in the Hughes County  
36 Zoning Ordinances.

37 **Q. Will the project meet the Hyde County ordinances?**

38 A. Yes. An analysis of potential shadow flicker impacts from the Project was conducted  
39 using the WindPro software package. The Project will install up to 71 wind turbines; however,  
40 78 potential turbine locations were evaluated. The WindPro analysis was conducted to determine  
41 shadow flicker impacts under realistic impact conditions (actual expected shadow) which  
42 includes measured historical meteorological conditions. This analysis calculated the total amount  
43 of time (hours and minutes per year) that shadow flicker could occur at receptors surrounding the  
44 Project turbines. Tables 11-3 and 11-4 in the application illustrate the results of the analysis and  
45 shows that the Project will meet the requirements in local ordinance.

46 **Q. If necessary, what mitigation measures will the project implement for project area  
47 residents?**

48 A. Section 11.5.3 outlines the procedures for the Project to follow in the event of shadow

49 flicker mitigation needs. Essentially the project will meet with a resident, work on site specific  
50 measures and implement them at project cost.

51 **Q. Are there known health impacts from shadow flicker?**

52 A. No, not that I am aware of. Shadow flicker frequency is related to the wind turbine's rotor  
53 blade speed and the number of blades on the rotor. From a health perspective, the relatively low  
54 flicker frequencies rates associated with the proposed wind turbines are harmless, and public  
55 concerns that flickering light from wind turbines can have negative health effects, such as  
56 triggering seizures in people with epilepsy are unfounded. Epilepsy Action (working name for the  
57 British Epilepsy Foundation) states that there is no evidence that wind turbines can cause seizures.  
58 However, they recommend that wind turbine flicker frequency be limited to 3 Hz (for comparison,  
59 strobe lights used in discos have frequencies which range from about 3 Hz to 10 Hz (1 Hz = one  
60 flash per second)). Since the proposed Project's wind turbine blade pass frequency is  
61 approximately 0.79 Hz (less than one alternation per second), no negative health effects to  
62 individuals with photosensitive epilepsy are anticipated.

63

64 Dated this 11th day of June, 2021.

65 /s/

66 Ted Guertin, Shadow Flicker – Tetra Tech