

**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 HYDE COUNTY, SOUTH
DAKOTA, FOR TRIPLE H WIND FARM**

SD PUC DOCKET EL _____

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

February 6 , 2019

TABLE OF CONTENTS

I.	Witness Introduction	1
II.	Purpose and Coverage of Testimony	3-4
III.		

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 2 Lan Drive, Suite 210, Westford, MA 01886.

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

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

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

9 A. I have over 29 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
14 analysis of shadow flicker, zone of visual impact (“ZVI”), wind farm photo simulations, and
15 initial wind resource evaluation. I have also served as a testifying expert witness and have
16 prepared technical 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 are called shadow flicker and can be a temporary
31 phenomenon 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.

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

37 A. Yes. An analysis of potential shadow flicker impacts from the Project was conducted
38 using the WindPro software package. As described above, the Project will install up to 92 wind
39 turbines; however, 103 potential turbine locations were evaluated. The WindPro analysis was
40 conducted to determine shadow flicker impacts under realistic impact conditions (actual
41 expected shadow) which includes measured historical meteorological conditions. This analysis
42 calculated the total amount of time (hours and minutes per year) that shadow flicker could occur
43 at receptors surrounding the Project turbines. Table 11-2 in the application illustrates the results
44 of the analysis and shows that the project will meet the requirements in local ordinance.

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

47 A. Section 11.5.3 outlines the procedures for the project to follow in the event of shadow
48 flicker mitigation needs. Essentially the project will meet with a resident, work on site specific

measures and implement them at project cost.

Q. Are there known health impacts from shadow flicker?

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

Dated this 6 day of February, 2019.

/s/

Ted Guertin, Shadow Flicker – Tetra Tech