BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of Kingwood Solar I LLC for a Certificate of Environmental Compatibility and Public Need	**)** **)** **)** **)**	**Case No. 21-0117-EL-BGN**

DIRECT TESTIMONY OF ALEX ROEDEL

Q.1. Please state your name, title and business address.

A.1. My name is Alex Roedel. I am the Sr. Director, Design & Engineering at Nextracker Inc. My business address is 6200 Paseo Padre Pkwy, Fremont, California.

Q.2. Please describe Nextracker and the type of products it sells.

A.2. Nextracker is the market share leader in solar trackers globally for the past 6 years based on number of trackers sold. Nextracker has sold trackers worldwide which have been installed in solar projects ranging from one MW to 1200 MWs located on six continents. Nextracker designs both the physical tracking structures for mounting solar modules as well as the advanced software controls of the solar trackers.

Q.3. What are your duties as the Senior Director, Design & Engineering at Nextracker Inc.?

A.3. I am responsible for project engineering globally at Nextracker and in charge of a global team of 50 engineers who are responsible for civil, mechanical, structural, and performance engineering design of solar power plants. This team is responsible for designing the installation of the largest fleet of solar trackers in the world.

Q.4. What is your educational and professional background?

A.4. I have a B.S. Mechanical Engineering from University of California – Santa Barbara and 13 years of experience in the solar industry. I have been previously employed at SPG Solar as a design engineer responsible for engineering, design, and developing construction sets for rooftop solar. I have also worked at SunPower Corporation as a utility scale design engineer, developing ground-mounted solar projects around the world. I joined Nextracker in 2015 and since then have been in charge of a team of engineers responsible for over 60 GW of solar projects around the world.

I have co-authored one white paper on advanced tracker design entitled "Designing for the Wind" (2018) regarding solar trackers and two white papers on extreme weather "Mitigating Extreme Weather Risk" Part 1 (2020) and Part 2 (2021). I have also spoken at multiple conferences, webinars, and speaking panels such as NREL Reliability Conference (2020 & 2021), PV Magazine Roundtable Europe (2020), and Nextracker Dynamic Wind Analysis (2019 & 2020).

Q.5. On whose behalf are you offering testimony?

A.5. I am testifying on behalf of the Applicant, Kingwood Solar I LLC, in support of its application filed in Case No. 21-0117-EL-BGN.

Q.6. What is the purpose of your testimony?

A.6. The purpose of my testimony is to describe the trackers that are expected to be utilized for the Kingwood Solar project and the trackers' design for and performance in high wind circumstances.

Q.7. What is a tracker?

A.7. A solar tracker is used in solar energy plants to angle the solar panels with the sun throughout the day. It is designed of steel components, most notably pile foundations, torque tubes, and module rails used to mount solar panels, and an electric motor. A solar tracker is the most common solar panel mounting structure used in large-scale installations. In my experience, a typical solar mount will contain one tracker and will support 80-90 panels. The overall length of a single tracker is approximately the size of a football field. The tracker's electric motor is located in the middle of the tracker. The trackers are controlled by electrical components programmed to position the solar panels to the correct sun angle throughout the day and/or defense position in presence of high winds. Images 1 and 2 below are pictures of installations with Nextracker trackers.

Image 1: *depiction of a tracker installation.*

Image 2: *solar panel arrays installed in agricultural land.*

Q.8. Where are Nextracker trackers used?

A.8. They are used globally because as noted earlier, Nextracker is the market share leader in the industry and the company has installed trackers in projects of various size totally 55 GWs. Roughly 40% of all solar tracker projects in the US and 30% of solar tracker projects globally use our product. Nextracker trackers have been selected for the largest project in the United States in Indiana and this project is roughly give times larger than the proposed site in Kingwood. Our trackers have been installed in nearly all environments including deserts (e.g. Chile, U.A.E., Arizona, and California), cold climates (e.g. Canada, Kazakhstan, and Minnesota), and regions prone to hurricanes (e.g. Australia, Mexico, Texas, Florida, and Louisiana) and tornadoes (e.g. Illinois, Indiana, Tennessee, and Texas).

Q.9. Does Nextracker take into account high wind events in the design of a tracker?

A.9. Yes, Nextracker has done extensive analysis and is certified by CPP Wind Engineering Consultants ("CPP"), the most notable wind-engineering firm in the United States. CPP is on the board of ASCE (national engineering code) as well as responsible for conducting wind analysis on skyscrapers and other structures. Nextracker's analysis includes consideration of both the engineering code, required building regulations, and wind tunneling testing results from CPP. The analysis also includes wind tunnel testing, physical field verification, and advanced engineering analysis. Nextracker's analysis has resulted in advanced control systems, including anemometers (a device used for measuring wind speed and direction) placed in the solar fields, as well components such as dampeners installed to reduce the effects of high winds.

Q.10. Do the trackers include sensors for wind events?

A.10. Yes, Nextacker places anemometer wind sensors around the site in order and allow the trackers to go into a wind stow defense position in the event of high winds on site. The wind sensors include data to take into account both wind speed and direction. Based on these variables, the tracker will stow into the direction of the wind to utilize downforce as well as go to a 60-degree defense position. This position is chosen in efforts to reduce the dynamic effects of wind on both the solar panels and tracker structure and preventing any damage to the tracker system and PV panels.

Q.11. Do you have knowledge of Nextracker trackers being in high wind events?

A.11. Yes, our trackers have been in various high wind events, including the following notable recent U.S. hurricanes: Hurricane Ida, Maria, Irma and others in wind speeds in excess of 130 mph. Additionally, Nextracker trackers are located in various solar

projects in Hurricane, Cyclonic, and special wind zones around the world, including Australia, India, and Mexico. Nextracker considers high wind events as those recorded over 40 mph, where the tracker would move into the safe defense position described above. There have been thousands of wind events with no damage.

Q.12. Does Nextracker monitor its trackers in high wind events?

A.12. Yes, Nextracker collects high wind event data through a comprehensive monitoring system which provides data on any faults, loss of communication, operating angles and other commands. Any error codes are monitored 24/7 by Nextracker in addition to any monitoring conducted by the operating owner. Nextracker reports any error codes to the operating owner for checks or repairs.

Q.13. Are you aware of any Nextracker trackers damaged during a high wind event?

A.13. I am aware of only one project site in West Texas which sustained reportable damage to trackers and panels due to a tornado. The tornado damaged small portions of the site, however all debris were displaced 10 feet or less from the install location. None exited the boundary of the site or caused significant damage or any human harm. Specifically, the damage included small portions of tubes dislodged and modules displaced from the mounting structure. All damage was repairable.

Q.14. Have you reviewed the Application in this proceeding?

A.14. I have reviewed the Application narrative and Appendix J (Representative Equipment Standards) to the Application.

Q.15. Are you familiar with the geographic area in which this Project is located?

A.15. Yes. I have reviewed satellite imagery, the American Land Title Association surveys, and the geotechnology report included in the Application. This Project is located

on agricultural land, which is the most common location for solar installations in the United States.

Q.16. Do you believe the Nextracker trackers are suitable for use by the Project as located?

A.16. Yes. The trackers expected to be utilized for this Project will be rated to a minimum of 105 mph winds, based on the application of ASCE 7-16. That code was used to determine the required wind speeds, seismic, snow, and ice loads to design the trackers for this Project. ASCE 7-16 is an engineering code that prescribes a set of minimum requirements for the structural requirements for all permanent structures, including buildings. The code is a referenced standard in the Ohio Building Code ("OBC"), although the code referenced in the OBC is ASCE 7-10 which is the 2010 version of the code while ASCE 7-16 is the 2016 version of the code. The 105 mph rating applies to the panel attachment to the tracker. The 105 mph rating is derived from ASCE 7-16 and reflects a once in a 300-year event. Nextracker will monitor the trackers during high wind events. Additionally, the trackers will go into a wind stow defense position in the case of a high wind event. Based on my experience and knowledge about Nextracker installations around the world, this site represents a low-risk based on wind, snow, temperature, seismic, and soil conditions, and I believe our product is more than suitable for use in the Project location.

Q.17. Does this conclude your direct testimony?

A.17. Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing was served upon the following via email on this 23rd day of February 2022.

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Summary: Testimony Direct Testimony of Alex Roedel electronically filed by Mr. Michael J. Settineri on behalf of Kingwood Solar I LLC