BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of Firelands Wind, LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Huron and Erie Counties, Ohio	)))))	Case No. 18-1607-EL-BGN

DIRECT TESTIMONY OF DENNIS SCHREINER ON BEHALF OF THE LOCAL RESIDENT INTERVENORS

Q.1. Please state your name and home address.

A.1. Dennis Schreiner, 8403 State Route 99, Sandusky, Ohio 44870.

Q.2. Does anyone else reside with you at that location?

A.2. Yes, I live there with my wife, Sharon Schreiner, who also is an intervenor in this case.

Q.3. Describe the property at your residence.

A.3. We live on a parcel of 10.6 acres that is zoned Residential/Agricultural. Of this acreage, 3.5 acres is under row crop tillage. We have a horse barn that is used for horses, goats and chickens. About two acres are in horse pasture that also is supplemented with portable electric fencing. We have a garden with an aquaponics system. I have a spring on my property that feeds into Pipe Creek that traverses the northwestern part of my property. There is a turnpike easement on my property that receives drainage from the Ohio Turnpike. We get our water from an on-site shallow well (25 feet deep with the water table as close as six feet).

Q.4. On whose behalf are you offering testimony in this case?

A.4. I am offering testimony on behalf of the Local Resident Intervenors Patricia Didion, Jane Fox, Marvin Hay, Theresa Hay, Patricia Olsen, Sheila Poffenbaugh, Walt Poffenbaugh, Christina Popa, John Popa, Lori Riedy, Charles Rogers, Kenn Rospert, Dennis Schreiner, Sharon Schreiner, Donna Seaman, William Seaman, Deborah Weisenauer, Kenneth Weisenauer, and Gerard Wensink (together, the “Local Residents”).

Q.5. Where do you live in relation to the Project Area for the Emerson Creek wind project?

A.5. Sharon and I own and live on property that is adjacent to the Project Area.

Q.6. Describe your educational background.

A.6. After graduating from High School, I entered the U.S. Navy (June 14, 1970). I had received a deferment since I was drafted when I was in my Senior year of High School. Technical Training in the Navy included: Basic Electricity and Electronics, Electronics Technician Training, Advanced Electronics Technician training specializing in Radar. Nuclear Training included Naval Nuclear Power School, Submarine Nuclear Prototype Training and certification as a Nuclear Reactor Operator.

In September 1976 I started work at the Davis-Besse Nuclear station (Davis Besse) and ultimately completed the Reactor Operator and Senior Reactor Operator training programs with Reactor Operator and Senior Reactor operator licenses issued by the Nuclear Regulatory Commission.

My U.S. Navy education is equivalent to an engineering degree. The Human Resources Department of Davis-Besse and the engineering director of Davis Besse determined in 1988, before hiring me, that my education was equivalent to an engineering degree. All of my job positions with Davis-Besse were available only to persons with engineering degrees or equivalent, for which I was determined by Davis Besse to be qualified.

Q.7. Describe your work experience.

A.7. I was assigned to the USS Seahorse Reactor Controls Division and was a Submarine Reactor Operator aboard a fast-attack nuclear submarine operating out of Charleston, South Carolina. I qualified on the Seahorse as a Submariner and Nuclear Reactor Operator and received my Submarine Dolphins indicating that I had these qualifications.

At Davis-Besse Nuclear Power Station between 1976 to 1981, I performed the duties of a Nuclear Regulatory Commission (NRC) Licensed Reactor Operator and NRC Senior Licensed Reactor Operator at and for the Davis-Besse Nuclear Plant in Oak Harbor, Ohio.

From 1981 to 1984 I was the Senior Instructor for Babcock & Wilcox (B&W) in Lynchburg, Virginia, which operated nuclear power plants. I was the Instructional Lead for both classroom and simulator training for all of the B&W plant operators and was authorized to administer Original Equipment Manufacturer certifications required for starting reactors by the NRC for all of the B&W plant operators at the time.

In 1884 I left B&W and formed my own consulting company to perform Contracted Independent Reactor Operator and Senior Reactor Operator License Certification and Testing required by the NRC.

From 1986 to 1988 I returned to Davis-Besse as a consultant to rewrite the Emergency and Abnormal Procedures for the Plant as mandated by an NRC order. This work consisted of converting event-based procedures to symptom-based procedures incorporating human factors engineering in concert with a Detailed Control Room Design Review.

In 1988 I returned to employee status at Davis-Besse by becoming the Operations Assessment Engineering Supervisor. Other positions held included Independent Safety Engineering Supervisor, Reactor Engineering Supervisor, Senior Maintenance Advisor, Staff Nuclear Advisor in the Project Management Section, Staff Nuclear Advisor in the Plant Engineering Section, Senior Consultant in Technical Services Engineering, Supervisor of Nuclear Engineering Programs, and finally a Senior Consulting Engineer assigned to provide decommissioning plans for Davis-Besse. My second career at Davis-Besse lasted 31 years.

Certifications earned throughout my career in addition to Licensed RO and SRO include: Certified MORT Accident/Incident Evaluator, Certified Transient Assessment Program Incident Investigator, Certified TapRoot Advanced Investigation Team Leader, and Station Review Board / Plant Operations Review Committee Member.

Q.8. What, if any, experience do you have with the PJM grid?

A.8. As a control room operator and supervisor of a large nuclear generation facility, I had conversations on more than a daily basis with the grid power dispatchers and planners to schedule increases and decreases in power production by Davis Besse in order to match increases and decreases in power production by other energy producers on the grid and in power demand by electricity consumers.

Q.9. Based on your experience, are you familiar with the term "intermittent energy source," and if so, what is an intermittent energy source?

A.9. Yes. Intermittent energy sources are sources that operate periodic rather than constantly. Some intermittent energy sources are periodic due to the fact that they are dependent upon meteorological conditions, which adds variability and uncertainty to the amount of power available for the grid. Some intermittent energy sources, such as peaker electric production plants fueled by diesel fuel or natural gas, produce dispatchable energy. That is, they can start energy production whenever the electricity is needed rather than waiting for weather conditions that enable production.

Q.10. Is wind power an intermittent energy source and, if so, what makes it an intermittent energy source?

A.10. Yes. Wind turbines are designed to generate electricity by using the wind as its energy source, so their energy production is dependent on the presence of suitable winds. A turbine will have a minimum wind speed that allows the internal systems to power-up and start generating power. If there is not sufficient minimum wind speed, no power is produced. The wind turbine also has a maximum wind speed that it is designed to produce power, after which point the turbine does not generate any additional power. For any particular turbine model installed it has an operating range of wind speeds. The power output from a wind turbine is directly tied to the variable availability of adequate wind. Cold weather allows for the production of more power from the same wind speed. Conversely, as the air temperature increases, the energy output decreases. Air temperature affects the density of the wind. In extreme atmospherics conditions, the wind turbines must be removed from service (i.e. extreme cold (sub-zero), or violent gusting wind and excessive wind.

Q.11. What, if any, experience do you have with the impacts of intermittent energy sources on the PJM grid?

A.11. My experience with “grid operators” or “load dispatchers started in 1976. In my role as a control room operator, I was briefed or notified on challenges to grid reliability. As technology has changed over the years, the interaction with the grid operator, now PJM, changed. My experience after being a control room operator and senior operator primarily shifted to more of the power production planning side. A concept of "risk to generation" was instituted that those of us that operated large generators would use to schedule maintenance, including plant shutdowns.

Q.12. What, if any, effects do intermittent energy sources have on the PJM grid?

A.12. With the increase in intermittent energy sources, generation risk factors change. Every time a power source stops producing energy for the grid, for whatever reason, the connecting and disconnecting from the grid introduces an opportunity for a failure of a power source or transient load condition (e.g., a spike or loss of power from a source, rather than a constant energy load). The cyclic nature of wind increases the risk to generation. For example, as shown in Exhibit A, wind turbines in Ohio in 2012 had an average annual production of only 27.2% of their nameplate capacity, which can lead to numerous grid switching transients. Exhibit A is a map provided by AWS Truepower with efficiency data added to it by Lisa Linowes of the Wind Action Group using detailed data compiled by the U.S. Energy Information Agency (EIA), a federal agency. AWS Truepower is owned by UL, which is affiliated with Underwriters Laboratories. EIA's web site has the following statement about its mission:

> The U.S. Energy Information Administration (EIA) is the statistical and analytical agency within the U.S. Department of Energy. EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA is the nation's premier source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the U.S. government.

In 2012 the average national wind turbine production was 32.4% of nameplate capacity according to EIA. [Dennis, is this figure from EIA?]

In the introduction of numerous smaller energy generators, the risk of transient introduction may not be proportionate to benefit. Besides the number of small machines introduced, wind introduces additional conductors and cabling that may well be over 100 miles for a small amount of electricity. For example, the Application for the Emerson Creek wind project states that it will have over 100 miles of cables for a project with a nameplate capacity of fewer than 300 megawatts of electricity. This additional transmission line length reduces the amount of electricity that reaches the grid. To offset the changing power factor, large generators often need to over-excite or under-excite their generators to bring the grid into optimum efficiency. A desire would be to have very power dense generators on the grid for better balance of power factor due to less transmission line needed. In the event of a wind turbine fault, or the sudden separation of the turbine from the grid, a certain amount of grid inertia is needed for continued energy production for controls systems to mitigate the transient. Inertia sometimes in industrial power systems is used to describe the energy stored in large rotating generators and some large, physically heavy industrial motors, which gives them the tendency to remain rotating. Some people call this a flywheel effect. Small engines of the past have had large flywheels attached to power them through large power demands of a short duration. This stored energy can be particularly valuable in electrical generation when a power plant fails, as it can temporarily make up for the power lost from the failed generator. This temporary response—which is typically available for a few seconds—allows the mechanical systems that control most power plants time to detect and respond to the failure. In PJM, inertia from large coal, natural gas, nuclear, and hydropower generators is abundant—and is sometimes taken for granted in the planning and operations of the system. As the grid changes to absorb increasing penetrations of inverter-based resources—e.g., wind, solar photovoltaics, and battery storage—these new generator systems do not inherently provide inertia, something that decreases the robust response of our grid to transients.

Q.13. Can the intermittent nature of energy sources such as wind power cause problems with the availability of electricity?

A.13. Yes. For example, wind turbines in Ohio had an annual average production of 27% of nameplate capacity in 2012, which can lead to lots of grid switching transients. See Exhibit A. In 2018 the national average wind turbine production was 34.6% of nameplate capacity according to the EIA. In contrast, nuclear plant production in 2019 was 93% of nameplate capacity according to the Nuclear Energy Institute, which reports this information to the Nuclear Regulatory Commission. According to 2015 statistics from the EIA, nationwide nuclear plant production was about 92% of nameplate capacity, nationwide coal plant production was about 53% of nameplate capacity, and nationwide natural gas plant production was about 55% of nameplate capacity. According to 2018 statistics from the EIA, nationwide nuclear plant production was 92.5% of nameplate capacity, nationwide coal plant production was about 53.6% of nameplate capacity, and nationwide natural gas plant production was 55% of nameplate capacity.

Failures of wind turbines are relatively frequent compared to other energy generators. According to a report by Exponent Engineering and Scientific Consulting entitled "Wind Turbine Reliability," in general about half of wind turbine failures are due to electric components and the control system, but these failures have low downtimes. Generator and gear box failures are less frequent but have longer downtimes. This study found that 25% of wind turbine faults caused 95% of the downtime. Reliability of wind turbines has improved with time and has achieved an availability of 98%, but wind turbines fail at least once per year, on average, with larger wind turbines failing relatively more frequently. This study of U.S. wind turbines found that when all sources of downtime are accounted for, the average wind turbine actively generates power for 1.5 days between downtime events and that the average downtime is 1.6 hours.

Unlike more conventional sources of power, wind does not follow demand and is therefore not dispatchable power.

California has changed their energy mix to favor renewables, by reducing coal, natural gas and nuclear generation. This shift is primarily responsible for the state's blackouts and high electricity prices. Higher air temperatures have led to greater demand for air conditioning. California and neighboring states that send power to California have experienced a reduction in generating capacity. While California is hot right now, weather conditions are well within the normal range for the state's summer weather. The bottom line in California's blackout causation is the lack of reliable in-state generation. Underlying reason for this lack of supply is that California has been closing both natural gas and nuclear power plants at an alarming rate as compared to other assets being used to bear the load, specifically, non-dispatchable power. For decades, California has asserted that major economies can run mostly, if not entirely, on intermittent renewables. Some groups believe that batteries are the way to integrate unreliable intermittent renewables onto the grid. Their logic is that even though renewables are unreliable, if you can store enough energy in batteries collected during periods of peak generating capacity, you should be able to redistribute it during periods where demand exceeds current generation, or so the argument goes. Batteries are simply not up to this immense task. One of the world's largest lithium battery storage centers is in California. It can only store enough short-term power to service 24,000 of California's 13,000,000 households because battery capacity is depleted in four hours. If demand surges for more than 4 hours, the system will fail. For renewables to work, batteries may need to be able to store the power for weeks and perhaps even months. People do not sit idly by when electrical systems fail or when reliability suffers. Businesses and individuals will reach for tried and true methods of powering their day-to-day lives. As we have seen after California closed the San Onofre nuclear plant in 2013, both carbon emissions and air pollution spiked because natural gas was dispatched to replace a carbon free generating source. Everywhere renewables are implemented, they drive up costs and drive down reliability.

For all of the hype, Ohio and California are largely areas of marginal wind efficiency. See Exhibit B hereto, which is a map of wind speeds provided by AWS Truepower. Also see Exhibit C, which is a map of average wind speeds in Ohio at 80 meters above ground level provided by AWS Truepower and the National Renewable Energy Laboratory. According to this map, the average wind speed in Ohio at 80 meters above ground level is only 7 meters per second.

Q.14. How does the cost of producing electricity with wind turbines compare to the cost of producing electricity from other energy sources?

A.14. Renewables contributed to electricity prices rising six times more in California than in the rest of the U.S. since 2011, the state's "take-off" year for rapid growth in wind and solar. This price rise occurred despite the state's reliance during the same years on persistently-low-priced natural gas. Solar and wind make electricity more expensive because they are unreliable, requiring 100 percent backup, and energy-dilute, requiring extensive land, transmission lines, and mining. Solar and wind developers do not pay for the costs they create but rather pass them on to electricity consumers and other producers.

Q.15. How do the higher production costs for producing electricity affect the price of electricity for consumers?

A.15. Renewables have the same impact everywhere in the world. They have caused electricity prices to rise 50 percent in Germany since 2007, the first year it got more than 10 percent of its power from subsidized wind, solar, and biomass. By 2019, German household electricity prices were 45 percent higher than the European average.

Q.16. What is your source of drinking water?

A.16. My property uses an onsite well that produces water from the aquifer at a level of 6 to 21 feet below the ground surface.

Q.17. Are any sinkholes located on your land?

A.17. Yes. There two sink holes on my property and an artesian spring. One sink hole is about five feet in diameter and another one is two feet in diameter. They are located in the north central part of my property.

Q.18. Does this conclude your direct testimony?

A.18. Yes.

CERTIFICATE OF SERVICE

On September 21, 2020, I served a copy of this filing by electronic mail on the following persons:

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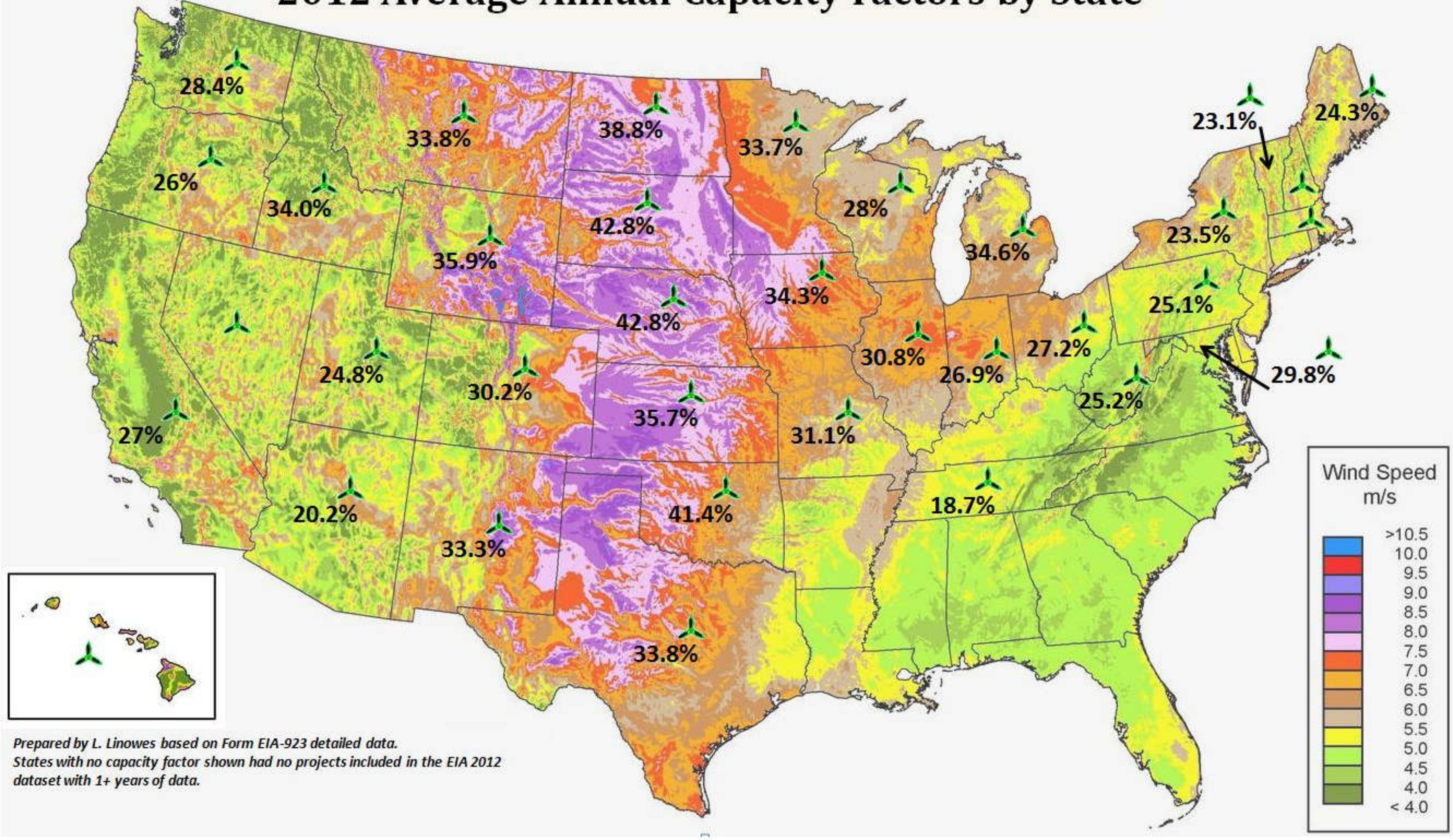
/s/ Jack A. Van Kley_____
Jack A. Van Kley

EXHIBIT A

2012 Average Annual Capacity Factors by State



Prepared by L. Linowes based on Form EIA-923 detailed data.
States with no capacity factor shown had no projects included in the EIA 2012 dataset with 1+ years of data.

EXHIBIT B

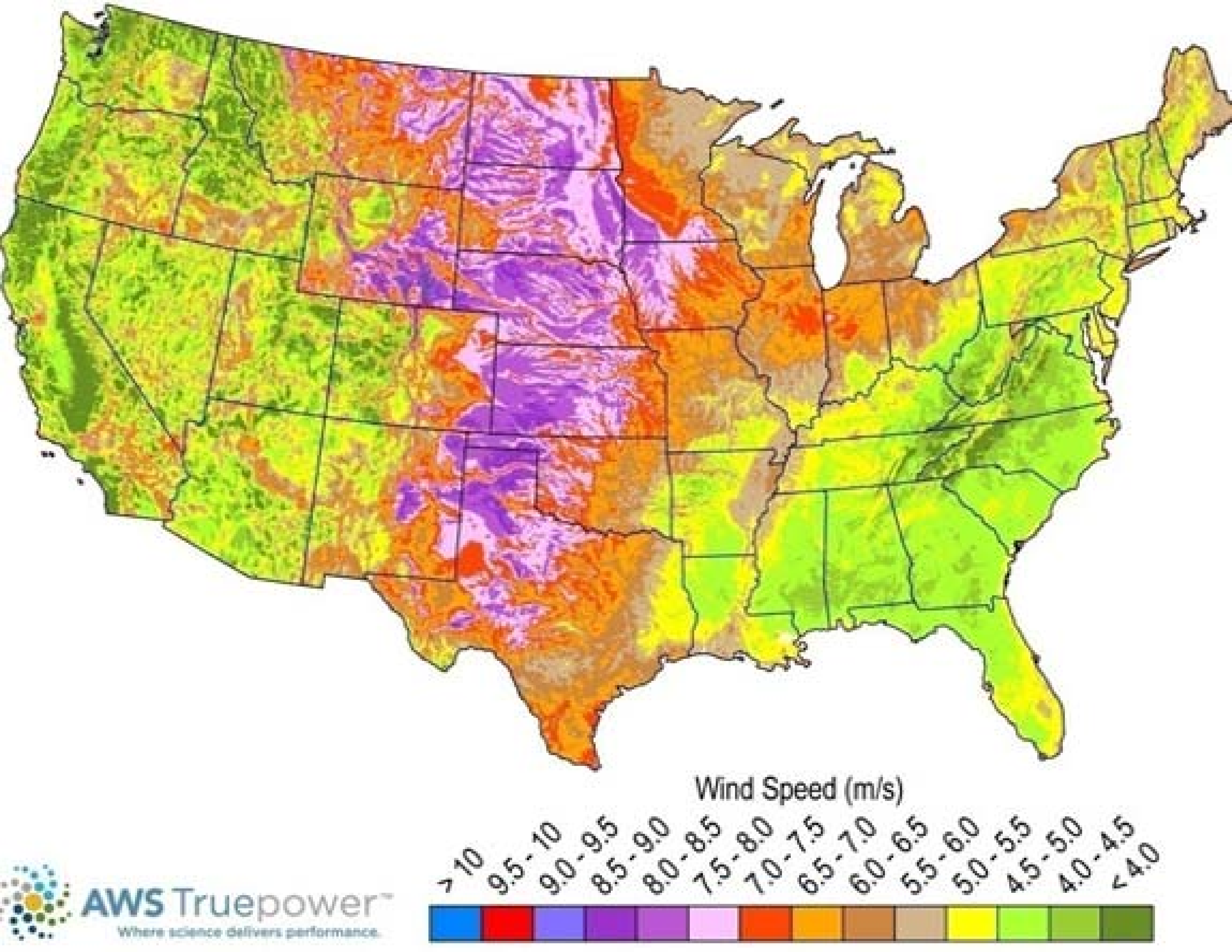

Wind Speed (m/s)
> 10
9.5 - 10
9.0 - 9.5
8.5 - 9.0
8.0 - 8.5
7.5 - 8.0
7.0 - 7.5
6.5 - 7.0
6.0 - 6.5
5.5 - 6.0
5.0 - 5.5
4.5 - 5.0
4.0 - 4.5
< 4.0
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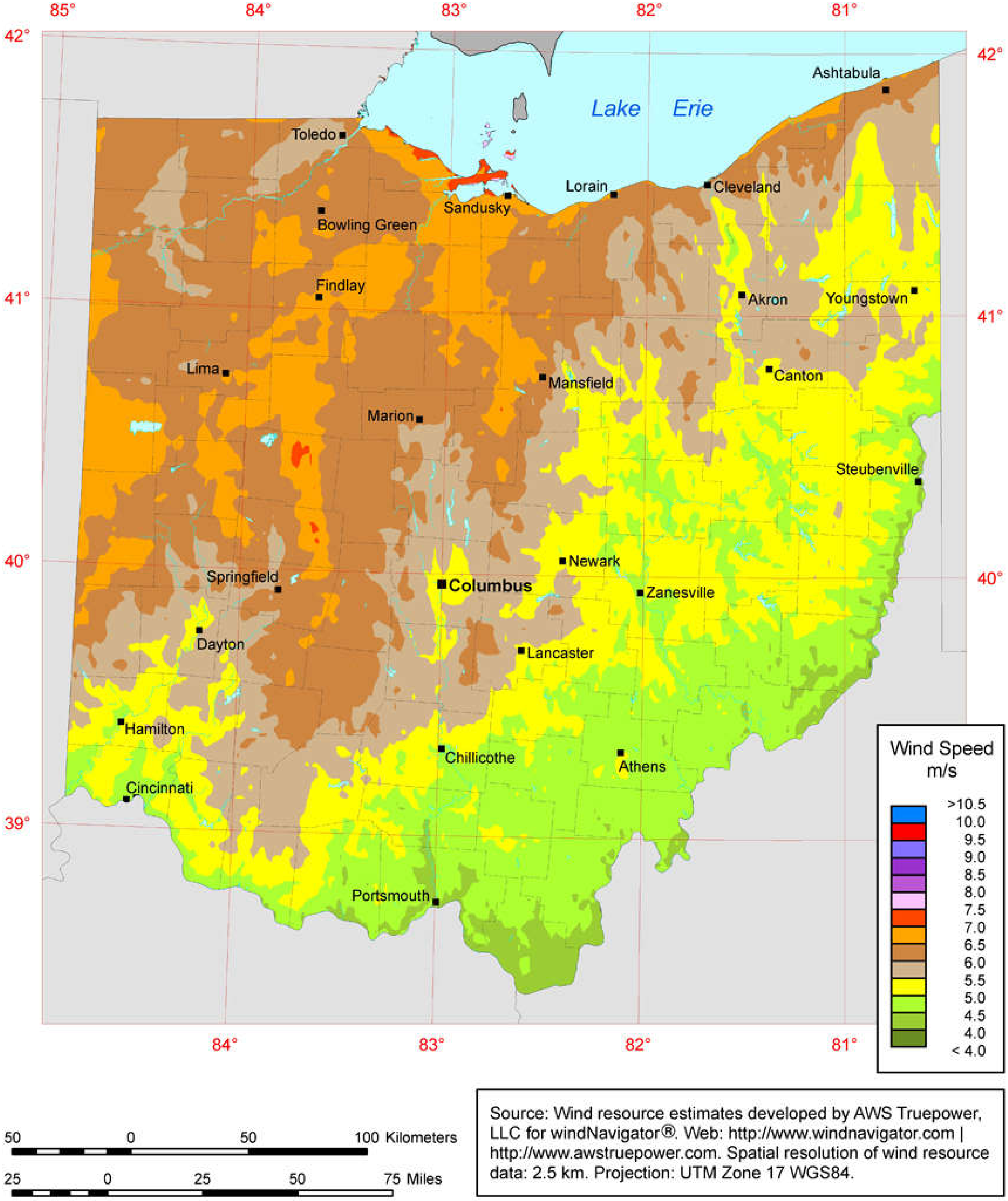
EXHIBIT C

Ohio - Annual Average Wind Speed at 80 m



Source: Wind resource estimates developed by AWS Truepower, LLC for windNavigator®. Web: http://www.windnavigator.com | http://www.awstruepower.com. Spatial resolution of wind resource data: 2.5 km. Projection: UTM Zone 17 WGS84.

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