ORR&RENO
ATTORNEYS AT LAW

Susan S. Geiger
sgeiger@orr-reno.com
Direct Dial 603.223.9154
Direct Fax 603.223.9054
Admitted in NH and MA

September 5, 2012

Via Hand-Delivery and Electronic Mail

Ms. Jane Murray, Secretary
New Hampshire Site Evaluation Committee
N.H. Department of Environmental Services
29 Hazen Drive
Concord, NH 03302-0095

Re: ***Docket No. 2012-01-Application of Antrim Wind Energy, LLC Third Supplement to Application - Wind Resource Information Requested by August 22, 2012 Order on Outstanding Motions***

Dear Ms. Murray:

Enclosed for filing with the New Hampshire Site Evaluation Committee in the above-captioned matter please find an original and 9 copies of Applicant's Third Supplement to Application and Appendix 21. This filing is submitted pursuant to Section E.i. of the Presiding Officer's August 22, 2012 Order on Outstanding Motions.

Please contact me if there are any questions about this filing. Thank you for your assistance.

Very truly yours,

Susan S. Geiger

Enclosures

cc: Service List (excluding Committee Members)
Clark A. Craig, Jr. (by first class mail)
917367_1

THIRD SUPPLEMENT TO APPLICATION OF ANTRIM WIND ENERGY, LLC

Docket No. 2012-01

Pursuant to Section E.(i) of the August 22, 2012 on Order on Outstanding Motions, the information provided below supplements Volume 1, Section F.3.a. of the Application of Antrim Wind Energy, LLC, which was submitted to the New Hampshire Site Evaluation Committee on January 31, 2012, and supplemented by filings made on August 10, 2012 and August 22, 2012.

VOLUME 1

Section F: Renewable Energy Facility Information

3.a. Fuel utilized - p. 23.

Replace existing text with the following:

Wind.

The wind resource characteristics of a specific site play a critical role in determining the commercial viability and relative competiveness of a wind development project. These characteristics include, but are not limited to, a higher average annual wind speed relative to alternative locations. Additional factors such as wind speed stability and consistency, frequency distribution, prevailing wind direction (generally perpendicular to the landform/turbine array), wind shear, density and turbulence characteristics are also important considerations. Many potential development areas may offer impressive average wind speeds, but deficiencies in these other qualities render them undevelopable.

AWE believes that the Antrim site offers an attractive and verifiable wind resource, in addition to meeting all of the other criteria that are necessary to support an economically and environmentally successful wind project. AWE's conclusion on the wind resource is based on a third party assessment of site-specific wind resource data by V-Bar, LLC, a leading meteorological consultant to the wind industry.

See Appendix 21 (submitted with this Third Supplement to Application) for V-Bar's complete summary report of the wind resource characteristics of the Antrim Project site and a description of their methodology for assessing wind resources in general. The following italicized information is excerpted from that document:

Overview of Wind Energy Resource Assessment

V-Bar utilizes industry standard practices to produce energy yield assessments for wind projects. The following is a summary of the ongoing application of those methods at the Antrim Project for AWE.

Collection of Meteorological Data

An appropriate wind resource assessment program starts with the collection of site-specific wind resource data that are geographically, topographically and meteorologically representative of the *project area. These data typically are at least one year in duration to avoid seasonal bias in estimates of long-term wind statistics.*

The raw data for the Antrim Project comes from two sources; 1) a 60-meter meteorological ("MET") tower which was installed in November 2009 adjacent to the location of proposed WTG #2; and 2) a remote sensing device called a LiDAR, which stands for light detection and ranging.

The LiDAR is ground-based, is relatively easily moved and measures wind data up to 200 m above ground level. We devised a LiDAR measurement campaign in November 2011 to supplement the MET data. The campaign requires systematically moving the LiDAR between the MET tower site and the approximate locations of WTG#6 and WTG #10 at specific intervals by season. The combination of the extended measurement period from the MET tower (28 months) and the deployment of the LiDAR provide a sound basis for estimating the wind resource across the site.

Data Quality Control

Prior to performing any analysis of the meteorological data for a given site, V-Bar quality controls the raw data to eliminate spurious data. We also verify the meteorological tower configuration and site conditions using the installation and maintenance documentation and field confirmation. Greg Poulos from V-Bar performed such a site visit on September 8, 2011.

In our quality control measures, V-Bar screens for invalid or missing data due to measurement equipment malfunction, tower shadowing effects and adverse weather conditions (e.g. icing) to establish a "clean" data set. Any missing data contributes to the inherent uncertainty in long term projections, and those uncertainties are represented in our uncertainty or "P-Value" analysis.

Turbine Array Plan

V-Bar has worked with AWE to design a turbine array plan that maximizes energy yield for the Antrim Project given the estimated on-site wind characteristics, available land, site constraints provided by AWE, and wind turbine manufacturer site suitability guidelines.

Long-term Wind Climate

Since the site data from a wind resource campaign do not represent the long-term average winds that would be present over the 20+ year lifetime of a wind farm, we rely on one or more long-term reference points to adjust the measured wind energy site statistics. These reference stations are airport, other semi-permanent weather stations or three-dimensional meteorological analysis data sets that employ professional meteorological quality-control procedures. These stations must have suitable correlation to the winds at the site in question. In the case of AWE, V-Bar uses two stations (Concord and Manchester, NH airports) to place the measured site data in a long-term context.

Data Measurement Height and Turbine Hub Height Difference

It is typical for the measurement height of site wind data (60 m at the AWE MET) and the hub heights of modern turbines (92 m for the proposed Acciona AW-3000/116) to differ due to the cost and availability of hub height wind resource assessment equipment. By collecting data from several measurement heights on the MET tower and through analysis of data from the LiDAR, we assessed the local shear exponent (rate of change in wind speed with height). We then extrapolate wind speeds up to the hub height of the wind turbine.

The LiDAR is helpful to reduce wind speed and shear uncertainty for the Antrim Project, given its ability to collect wind speeds up to 200 m above the ground and our ability to compare it to the meteorological tower on site for validation purposes.

Gross Energy Yield Estimates

Based on the long-term average annual hub-height wind speed estimates from the onsite measurements, and the topography, geography and meteorology of the site, we model individual turbine long-term hub-height wind speed. The turbine power curve, adjusted to the local hub-height air density, is applied to the measured wind speed distribution to calculate the gross energy production by wind speed. Using that gross energy calculation and the turbine wind speed estimate, we calculate the gross energy yield for each turbine. The individual turbine estimates are aggregated to estimate the Antrim Project's Gross Capacity Factor ("GCF"). The GCF is expressed as a percentage of maximum possible turbine output averaged over an annual period.

Losses from Gross Energy Yield

There are various loss factors (inherent in the operation of a wind farm) that reduce the actual energy production from its gross value. We estimate losses due to availability (maintenance down-time etc.), turbine wake effects, electrical transmission, turbine performance (turbulence, inclined flow and high shear, high-wind hysteresis), and environmental factors (blade soiling, icing, extreme temperatures and weather events), curtailment, sub-optimal operations and balance of plant outages. A final accounting of losses for the Project will be shown in a final financeable wind energy resource assessment report to be provided to AWE. These losses are calculated on an energy basis to determine the overall wind farm efficiency.

Net Capacity Factor and Net Energy Yield

We apply the project-specific loss factors, expressed as an efficiency, to the GCF for the AWE project to estimate the net energy yield or the Net Capacity Factor ("NCF"). NCF is expressed as a percentage of peak turbine output averaged over an annual period. The turbine-specific NCF is used to calculate the long-term mean annual aggregate net energy production for AWE.

<u>Characteristics of the Antrim Project Wind Resource</u>

Wind Class

The wind resource at the Antrim Wind Project is characterized as an IEC (International Electrotechnical Commission) Class IIa/IIIa wind resource. V-Bar estimates the long term hub-height (92 m) wind speeds at AWE are in the 7.0-8.3 m/s range for the (10) proposed Acciona AW-116/3000 turbines. As additional meteorological data is collected at AWE these values may fluctuate somewhat.

Shear

The long-term mean average shear exponent at the AWE meteorological tower is 0.13 which is in the low and normal range for wind farm sites. Additional information is being collected by the LiDAR and the MET. These data will be analyzed in future reports.

Turbulence

Mean turbulence intensities range from 11-15% for wind speeds above 4 mps, which is considered moderate turbulence. Additional information is being collected by the LiDAR and the MET and will be analyzed in future reports.

Wind Direction

Onsite measurements show that the prevailing wind direction across the Antrim Project site is generally from the northwest, which is typical for sites in this region of the country. The wind power *rose for AWE is shown below. Because the winds are often nearly perpendicular to the AWE ridgeline, the proposed turbine array is rather efficient with regard to wake losses.*

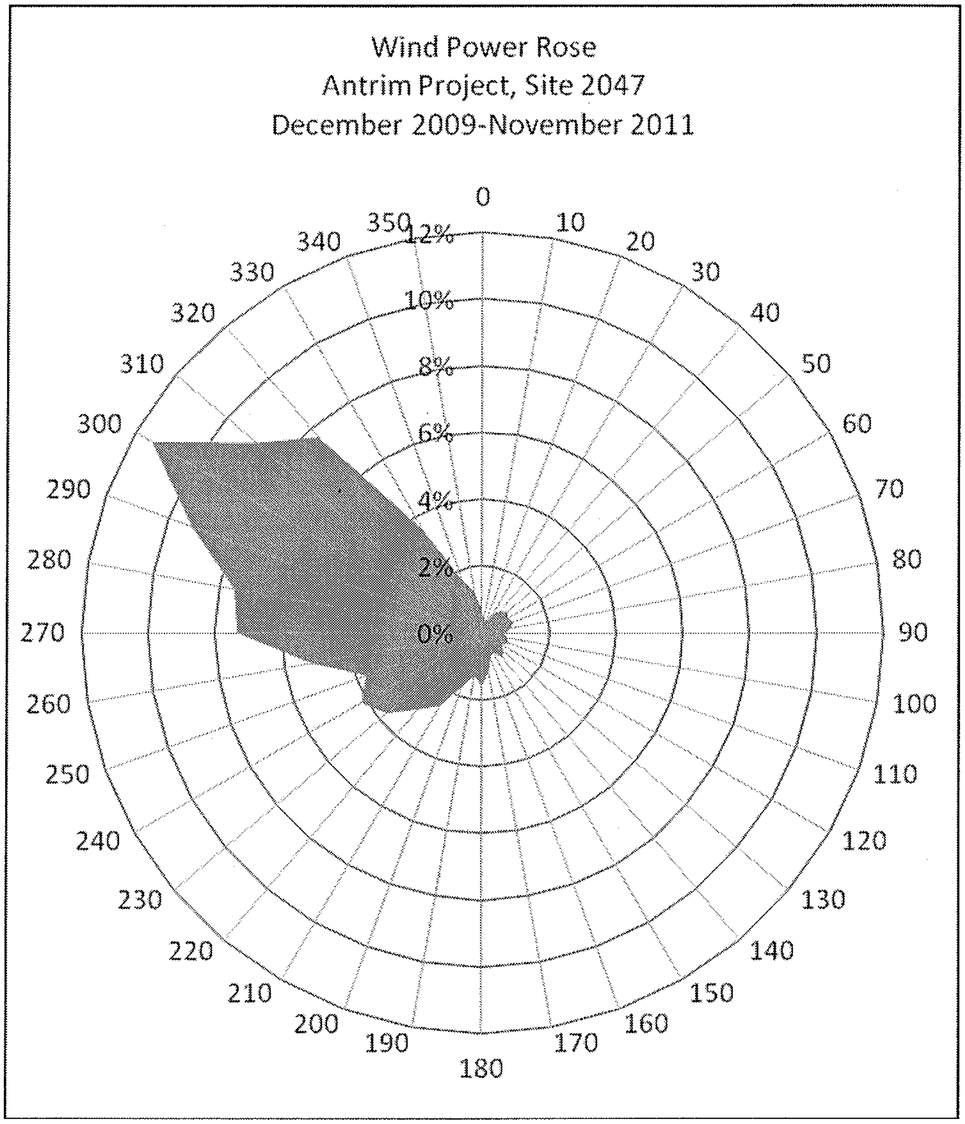

Figure: Wind power rose for the Antrim Project.

Seasonal Patterns

The general seasonal variations in wind speed at the Antrim Project are consistent with ridgeline wind projects in New England, with generally stronger winds and therefore wind energy production during the cold season months. The estimated winter NCF is 50.3%.

Diurnal Patterns

The daily variations in wind speed are different for different months, but generally are stronger during the nighttime hours (6pm-6am local time) throughout the year. The estimated nighttime NCF is 44.8%.

Energy Yield Comparison

AWE requested that V-Bar calculate the net energy differences between the proposed Acciona AW-116/3000 turbine and the legacy turbines that have been certificated before the SEC and are currently operating or under construction in New Hampshire. The legacy turbines of interest are the Gamesa G87 (2.0-MW) and Vestas V-90 (3.0-MW) models.

The table below describes the relative differences in Antrim Project's aggregate NCF and energy production using (10) of those turbines compared with the proposed AW-116/3000 machine:

Turbine Model	***Rotor Diameter (meters)***	***Tip Height (feet)***	***Change in NCF***	***Change in Energy Delivered***
Gamesa G87	*87*	*399*	*-14%*	*-43%*
Vestas V-90 (3.0-MW)	*90*	*400*	*-32%*	*-32%*

Source: V-Bar, LLC: Antrim Wind Energy Project: Summary of Wind Resource Assessment, September 4, 2012

Further Explanation of Turbine Comparison

The above analysis from V-Bar is based on a (10) ten turbine layout for the G87 (2.0 MW each / 20 MW total) and the V90 (3.0 MW each / 30 MW total). It is important to note that while the NCF reduction is less for the G87 compared to the V90, there would be significantly less energy delivered using the G87 because the size of the Project would be reduced from 30 MW to 20 MW.

Evolution of Turbine Technology

A wind project's net capacity factor ("NCF") is a function of the site's wind resource characteristics and the proposed wind turbine's power curve performance. In the latter regard, wind projects currently under development are benefiting from a continued evolution in turbine technology, which has given rise to a new "class" of larger rotor turbines such as the Acciona AW3000/116, the Nordex N117, the Vestas V112, the Siemens SWT-113, and the Alstom ECO-122, to name a few.

These larger rotor turbines rely on two key attributes to achieve greater efficiency in energy yields: 1) higher hub heights, which increase realized wind speeds while providing sufficient clearances from ground vegetation or topography induced turbulence; and 2) larger rotor diameters, whose larger rotor swept area increases energy capture. For a given site, these efficiency gains effectively increase the NCF and lower the cost of delivering wind energy to the grid. The associated NCF increases can be dramatic, especially at Class II and Class III wind sites such as Antrim, which show larger incremental gains relative to the existing technology than even higher wind Class I sites do.

The larger rotor machines have the added benefit of harvesting more energy from a single turbine location without a commensurate increase in the area of disturbance or additional infrastructure. For comparison, in the case of the Antrim Project, fifteen (15) 2MW Gamesa G-87 turbines (the same turbines used in the Lempster Project) would be required to match the nameplate capacity of the Project as currently designed – and yet the G87 energy yield would still be lower due to NCF advantage of the AW3000/116 as shown above. That is, even with 50% more turbines, a (15) fifteen turbine G87 project would still yield an estimated 14% less energy.

Implications of AWE's Turbine Selection

Given the length of time typically required to plan and permit a wind project, the larger rotor machines such as the Acciona AW3000/116 were not an available option for projects built through this year (2012), with few exceptions. In contrast, the Antrim Project's timeline enabled AWE to incorporate the larger rotor turbines into its project plan, a feature that is crucial to the competitiveness of the Project. The resulting project design achieves 30 MW of installed capacity on a land constrained site, increases NCF and energy yield, all while meeting a rigorous set of constraints and keeping the amount of environmental impact on a per-MW basis substantially below that of other projects previously certificated in New Hampshire.

AWE expects the larger nameplate capacity and larger rotor turbines to become industry standard for projects built in 2013 and beyond. AWE believes the trend toward higher efficiency, larger rotor turbines represents a positive development as these turbines reduce the cost of wind energy, thereby enabling more wind energy production using fewer turbines.

917320_1

V-BAR

4 September 2012

New Hampshire Siting Evaluation Committee
c/o NH Department of Environmental Services
P.O. Box 995
29 Hazen Drive
Concord New Hampshire 03302-0095

Re: Antrim Wind Energy Project: Summary of Wind Resource Assessment

To whom it may concern:

This wind resource summary is being provided by V-Bar, LLC ("V-Bar") as an information supplement to Section F.3a of Antrim Wind Energy, LLC's ("AWE") Application for a Certificate of Site and Facility for the Antrim Wind Project (the "Project"), a proposed 30 MW wind power facility in Hillsborough County, NH.

V-Bar, LLC provides comprehensive meteorological and wind resource support to the global wind energy industry. This includes early to late stage project development, financeable resource assessment, due diligence and operations. V-Bar's principals have been working on wind resource assessment in the wind energy industry since 1978 and are all degreed meteorologists, with two Master's degrees and one PhD among them. They have personally sited over 10,000-MW of wind turbines and have worked on wind resource assessment for over 25% of all operating turbines in the United States.

V-Bar has provided meteorological services to AWE since November 2010. The scope of V-Bar's services have included: equipment verification and validation, site inspections, data quality control, design and oversight of lidar measurement campaign, turbine array recommendations (subject to AWE-provided constraints), gross-to-net energy loss calculations and long term wind resource and net energy production estimates.

Overview of Wind Energy Resource Assessment

V-Bar utilizes industry standard practices to produce energy yield assessments for wind projects. The following is a summary of the ongoing application of those methods at the Antrim Project for AWE.

Collection of Meteorological Data

An appropriate wind resource assessment program starts with the collection of site-specific wind resource data that are geographically, topographically and meteorologically

400 E. Capitol Park Avenue #404 Salt Lake City, UT 84103 Tel: +1-801-712-6107 Fax: +1-801-906-0119

representative of the project area. These data typically are at least one year in duration to avoid seasonal bias in estimates of long-term wind statistics.

The raw data for the Antrim Project comes from two sources; 1) a 60-meter meteorological ("MET") tower which was installed in November 2009 adjacent to the location of proposed WTG #2; and 2) a remote sensing device called a LiDAR, which stands for light detection and ranging.

The LiDAR is ground-based, is relatively easily moved and measures wind data up to 200 m above ground level. We devised a LiDAR measurement campaign in November 2011 to supplement the MET data. The campaign requires systematically moving the LiDAR between the MET tower site and the approximate locations of WTG#6 and WTG #10 at specific intervals by season. The combination of the extended measurement period from the MET tower (28 months) and the deployment of the LiDAR provide a sound basis for estimating the wind resource across the site.

Data Quality Control

Prior to performing any analysis of the meteorological data for a given site, V-Bar quality controls the raw data to eliminate spurious data. We also verify the meteorological tower configuration and site conditions using the installation and maintenance documentation and field confirmation. Greg Poulos from V-Bar performed such a site visit on September 8, 2011.

In our quality control measures, V-Bar screens for invalid or missing data due to measurement equipment malfunction, tower shadowing effects and adverse weather conditions (e.g. icing) to establish a "clean" data set. Any missing data contributes to the inherent uncertainty in long term projections, and those uncertainties are represented in our uncertainty or "P-Value" analysis.

Turbine Array Plan

V-Bar has worked with AWE to design a turbine array plan that maximizes energy yield for the Antrim Project given the estimated on-site wind characteristics, available land, site constraints provided by AWE, and wind turbine manufacturer site suitability guidelines.

Long-term Wind Climate

Since the site data from a wind resource campaign do not represent the long-term average winds that would be present over the 20+ year lifetime of a wind farm, we rely on one or more long-term reference points to adjust the measured wind energy site statistics. These reference stations are airport, other semi-permanent weather stations or three-dimensional meteorological analysis data sets that employ professional meteorological quality-control procedures. These stations must have suitable correlation to the winds at the site in question. In the case of the Antrim Project, V-Bar uses two stations (Concord and Manchester, NH airports) to place the measured site data in a long-term context.

Data Measurement Height and Turbine Hub Height Difference

It is typical for the measurement height of site wind data (60 m at the AWE MET) and the hub heights of modern turbines (92 m for the proposed Acciona AW-3000/116) to differ due to the cost and availability of hub height wind resource assessment equipment. By collecting data from several measurement heights on the MET tower and through analysis of data from the

LiDAR, we assessed the local shear exponent (rate of change in wind speed with height). We then extrapolate wind speeds up to the hub height of the wind turbine.

The LiDAR is helpful to reduce wind speed and shear uncertainty for the Antrim Project, given its ability to collect wind speeds up to 200 m above the ground and our ability to compare it to the meteorological tower on site for validation purposes.

Gross Energy Yield Estimates

Based on the long-term average annual hub-height wind speed estimates from the onsite measurements, and the topography, geography and meteorology of the site, we model individual turbine long-term hub-height wind speed. The turbine power curve, adjusted to the local hub-height air density, is applied to the measured wind speed distribution to calculate the gross energy production by wind speed. Using that gross energy calculation and the turbine wind speed estimate, we calculate the gross energy yield for each turbine. The individual turbine estimates are aggregated to estimate the Antrim Project's Gross Capacity Factor ("GCF"). The GCF is expressed as a percentage of maximum possible turbine output averaged over an annual period.

Losses from Gross Energy Yield

There are various loss factors (inherent in the operation of a wind farm) that reduce the actual energy production from its gross value. We estimate losses due to availability (maintenance down-time etc.), turbine wake effects, electrical transmission, turbine performance (turbulence, inclined flow and high shear, high-wind hysteresis), and environmental factors (blade soiling, icing, extreme temperatures and weather events), curtailment, sub-optimal operations and balance of plant outages. A final accounting of losses for the Project will be shown in a final financeable wind energy resource assessment report to be provided to AWE. These losses are calculated on an energy basis to determine the overall wind farm efficiency.

Net Capacity Factor and Net Energy Yield

We apply the project-specific loss factors, expressed as an efficiency, to the GCF for the AWE project to estimate the net energy yield or the Net Capacity Factor ("NCF"). NCF is expressed as a percentage of peak turbine output averaged over an annual period. The turbine-specific NCF is used to calculate the long-term mean annual aggregate net energy production for AWE.

Characteristics of the Antrim Project Wind Resource

Wind Class

The wind resource at the Antrim Wind Project is characterized as an IEC (International Electrotechnical Commission) Class IIa/IIIa wind resource. V-Bar estimates the long term hub-height (92 m) wind speeds at AWE are in the 7.0-8.3 m/s range for the (10) proposed Acciona AW-116/3000 turbines. As additional meteorological data is collected at AWE these values may fluctuate somewhat.

Shear

The long-term mean average shear exponent at the AWE meteorological tower is 0.13 which is in the low and normal range for wind farm sites. Additional information is being collected by the LiDAR and the MET. These data will be analyzed in future reports.

Turbulence

Mean turbulence intensities range from 11-15% for wind speeds above 4 mps, which is considered moderate turbulence. Additional information is being collected by the LiDAR and the MET and will be analyzed in future reports.

Wind Direction

Onsite measurements show that the prevailing wind direction across the Antrim Project site is generally from the northwest, which is typical for sites in this region of the country. The wind power rose for AWE is shown below. Because the winds are often nearly perpendicular to the AWE ridgeline, the proposed turbine array is rather efficient with regard to wake losses.

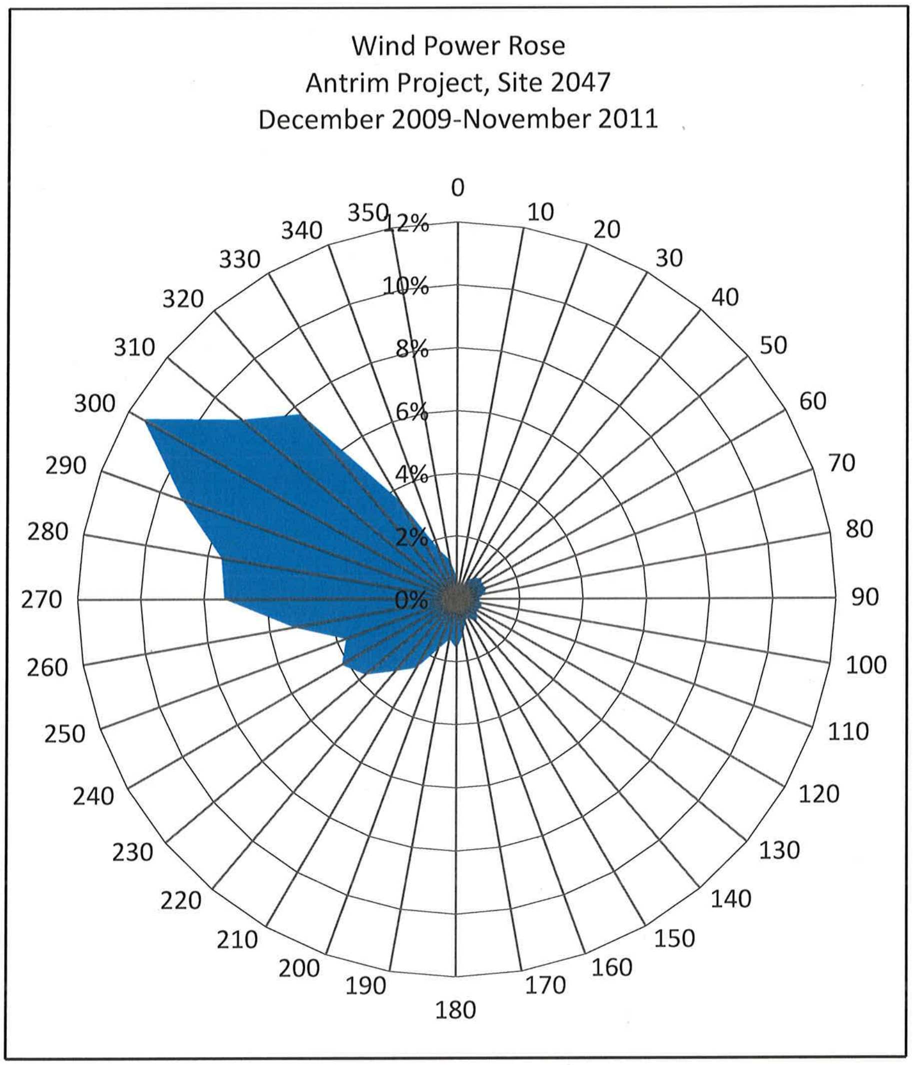

Figure: Wind power rose for the Antrim Project.

Seasonal Patterns

The general seasonal variations in wind speed at the Antrim Project are consistent with ridgeline wind projects in New England, with generally stronger winds and therefore wind energy production during the cold season months. The estimated winter NCF is 50.3%.

Diurnal Patterns

The daily variations in wind speed are different for different months, but generally are stronger during the nighttime hours (6pm-6am local time) throughout the year. The estimated nighttime NCF is 44.8%.

Energy Yield Comparison

AWE requested that V-Bar calculate the net energy differences between the proposed Acciona AW-116/3000 turbine and the legacy turbines that have been certificated before the SEC and are currently operating or under construction in New Hampshire. The legacy turbines of interest are the Gamesa G87 and Vestas V-90 (3.0-MW) models.

The table below describes the relative differences in AWE aggregate NCF and energy production for those turbines compared with the proposed AW-116/3000:

Turbine Model	Rotor Diameter (meters)	Tip Height (feet)	Change in NCF	Change in Energy Delivered
Gamesa G87	87	399	-14%	-43%
Vestas V-90 (3.0-MW)	90	400	-32%	-32%

This concludes our summary.

Sincerely,

Gregory S. Poulos

Managing Director

400 E. Capitol Park Avenue #404 Salt Lake City, UT 84103 Tel: +1-801-712-6107 Fax: +1-801-906-0119