STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 4.8 MW Wind Renewable Generating Project on Flagg Hill Road in Colebrook, Connecticut ("Wind Colebrook South")	**Petition No. 983** **March 14, 2011**

PRE-FILED TESTIMONY OF PIERRE HÉRAUD, Ph.D

Q1. Dr. Héraud, please state your name and position.

A. Dr. Pierre Héraud, I manage the Wind Farm Design Team within the North American Project Development group. I work for Helimax Energy, Inc. in Montreal, Quebec, Canada which is part of GL Garrad Hassan ("GL GH"). GL GH has offices located at 45 Main Street, Suite 302, Petersborough, New Hampshire.

Q2. Please state your qualifications.

A. I am responsible for wind farm project development and engineering for GL Garrad Hassan North America. Specifically I'm involved with wind farm impact assessments, commissioning of meteorological towers, wind resource assessment programs, detailed analysis of wind farm constraints (technical, environmental, social) and optimization of wind farm layouts and other matters, including post-construction noise monitoring.

I obtained a PhD in physics from the Université de Provence in 2002. Since 2005, my professional career has been dedicated to wind energy related issues. I have over five years of experience in environmental impact assessments of wind farms in North America. I set up an ice throw risk, noise impact and shadow flicker assessment team within GL Garrad Hassan North America and have conducted multiple comprehensive ice throw risk assessments on utility-scale wind farms.

A copy of my resume is attached hereto as Exhibit 1.

Q3. Please describe your involvement in this matter.

A. GL GH was retained to conduct studies concerning ice throw risk assessment of the BNE Energy Inc. ("BNE") project, named Wind Colebrook South, located on Flag Hill Road in Colebrook (the "Site"). A copy of GL GH's ice throw risk assessments for two wind turbine models (GE 1.6-100 and GE 1.6-82.5) are attached hereto as Exhibit 2 and Exhibit 3.

Q4. Please describe the results of GL GH's ice throw risk assessment.

A. The ice throw analyses are contained in Exhibit 2 and Exhibit 3 (referred herein as "Ice Throw Reports"). GL GH analyzed BNE's two (2) scenario wind turbine models, the 1.6 MW GE 1.6-100 with a 100 meter hub-height and 100 meter rotor diameter and the GE 1.6-82.5 with a 100 meter hub-height and 82.5 meter rotor diameter using meteorological data collected at the Site and supplied by BNE's.

The assessment methodology used was developed by GL GH in conjunction with the Finnish Meteorological Institute and Deutsches Windenergie-Institut as part of the research project entitled Wind Energy Production in Cold Climates ("WECO"). The results of the numerical modeling are shown in the said Ice Throw Reports. The number of ice fragments potentially thrown by an operating turbine per year was calculated according to WECO guidelines. This calculation is based on an estimate of 12 icing days for the Colebrook South Project.

The typical distance of an ice throw event is the distance within which 90% of the ice throw or drop events would be expected to occur; this has been calculated to be within 160 m of the turbine, based on the GE 1.6-100 turbine model and to be within 140 m of the turbine based, on the GE 1.6-82.5 turbine model. The maximum distance an ice fragment can be thrown has been estimated, for the GE 1.6-100 scenario, to be 285 m and for the GE 1.6-82.5 scenario, it was estimated to be as distance of 265 m.

Based on the results of the analyses, it would be prudent to employ a control method at the Project to minimize the risk of potentially damaging ice fragments. These control methods are described in the said Ice Throw Reports. If the control methods are implemented, only ice fragments being dropped from the wind turbine will present a significant risk level and it is estimated that only very high winds in a specific direction may cause ice fragments of any significant mass to be blown a distance beyond the overhang of the turbine.

Based on an estimated 12 days of icing, the probability of an ice fragment striking a stationary person located at the overhang distance and present for all icing events is once in 40 years for the GE 1.6-100 scenario and once in 31 years for the GE 1.6-82.5 scenario.

Q5. How does the estimated number of icing days compare to a long term reference?

A. The on-site meteorological measurement indicates that 12 days of data were corrupted due to suspected icing on the instrumentation. This number of days was used to be a representative estimate of the on-site number of icing days. This number of icing days is coherent with the NCDC long term data which estimates the mean number of days with freezing precipitation to be 10 to 15 per year for most of the State of Connecticut. The mean number of days with freezing precipitation is commonly seen as a conservative estimate of the number of icing days which are defined by 24 hours of ice accumulation. Therefore the measured 12 icing days has been taken as an input for the calculation.

Q6. Could you describe the recommended control method to mitigate the ice throw risk?

A. The recommended control methods are described below:

Icing events procedure

- The wind farm will be monitored 24 hours per day, 7 days per week. The turbines are expected to be monitored remotely by GE and by onsite personnel during regular business hours and icing events.

- BNE and GE will be continuously monitoring meteorological measurement and weather forecasts for the conditions under which icing events might occur: Temperature +- 4ºF around freezing temperature (32ºF) and a relative humidity greater than 97 %. If there is a potential for an icing event, BNE and remote monitoring staff will monitor the total aggregate output of the facility in comparison to the actual wind speed.

- The turbines operate within a specific range, producing certain amounts of power at different wind speeds. Ice formation will affect the aerodynamics of the turbine blades and will decrease turbine power output. If the power output is not within a certain range the turbines will be automatically shut down.

- In addition to this system, the turbines will be equipped with vibration sensors which will detect an imbalance. If ice does start to form on the blades, the blades could become unbalanced; the resulting vibration will be detected by the vibration sensors. If this occurs the turbines will automatically be shut down.

- The turbines can also be shut down remotely and manually on-site.

Re-start procedure

- If the turbines are shut down due to icing, BNE will be responsible for monitoring the turbines until the ice has fallen from the blades and the turbines can resume normal operating conditions.

- The turbines will remain shut-down until BNE can assess the operating conditions of the turbine. At that time, BNE may restart the turbines provided that the area affected by possible ice falling is appropriately monitored to prevent injury to people in the area or damage to property. A designated technician will be present at the turbine site before and after an iced turbine is started up. This individual will assess whether or not a turbine that has been subject to an icing event poses any risk to adjacent individuals or property before deciding if the turbine should be restarted.

- BNE will do a thorough visual inspection and validate the totality of the ice melt before restarting the wind turbine. BNE shall remain on site for the next hour of operation to ensure there is no remaining risk.

- In extreme conditions, BNE will curtail or shutdown turbines in advance of the turbines being subjected to ice build up on the turbine blades and thus the risk of ice throw. Depending on the wind direction and conditions of the icing event, turbines may be manually positioned (by yawing) out of the upwind position to reduce direct ice build up on the turbine and blades.

- There will be no specific technique to remove ice build up on the blades. It is common to wait for the ice to melt and fall from the blades. BNE will thoroughly inspect and validate the turbines to ensure that there is no remaining ice on the blades prior to restart.

Q7. Does this conclude your testimony?

A. Yes.

March 14, 2011
Date

Dr. Pierre Héraud

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