STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

BNE Energy, Inc. Petition For a Declaratory Ruling That No Certificate of Environmental Compatibility and Public Need Is Required for the Construction, Maintenance, and Operation of a 4.8 MW Wind Renewable Generating Facility Located on Flagg Hill Road, Colebrook, Connecticut.	**Petition 983** **February 24, 2011**

PETITION 983: BNE ENERGY
COLEBROOK, CONNECTICUT
PRE-HEARING INTERROGATORIES, SET ONE

Q1. What were the results of BNE's mailing of notices to abutting property owners? How many return receipts did BNE receive? If some receipts were not returned, did BNE make additional efforts to notify abutters?

A1. As the Council is aware, BNE was not legally required to send out an abutters mailing. However, as indicated in BNE's petition, BNE undertook an abutters mailing for the benefit of the public. BNE received return receipts from all but one abutting property owner. Copies of the return receipts are attached hereto as Exhibit 1. BNE sent a second and final mailing to the remaining abutting property owner via U.S. Mail.

Q2. On what date was BNE's legal notice in the Litchfield County Times published? Provide the affidavit of publication if available.

A2. Again, while not legally required, BNE undertook publication of a legal notice in the Litchfield County Times on December 3, 2010. A copy of the affidavit of publication is attached hereto as Exhibit 2.

Q3. How many properties were investigated and rejected in the search for the Wind Colebrook South project's site in this area? List those properties.

A3. BNE spent more than a year looking for appropriate sites in Connecticut conducive to commercial wind production. BNE explored various locations by the shore, and on high elevation properties in Prospect, Colebrook and throughout the northwest corner of the state. BNE was aware of the wind resources in Colebrook, and focused its search on the higher elevation properties in the town with enough land to support multiple turbines and with minimal impacts. We reviewed several properties in Colebrook, but did not pursue them due to a number of factors including available land, proximity to the electrical grid, and the proximity to the center of town and residences. We initially met with the former owner of the Colebrook South property, but were unable to agree on terms of a lease on the property. We also reviewed multiple properties in Norfolk, Canaan, Falls Village, Lakeville, Kent, Cornwall, and Sharon, but did not pursue them for a variety of reasons including expected wind resources, available land, cost of land, proximity to the electrical grid, and the proximity to the center of town and residences. During our property reviews, the site now known as Colebrook South became available in a foreclosure sale. BNE attended the auction and purchased the property in November 2007. The Property has sufficient land for the production of commercial wind energy on the site while ensuring proper setbacks and mitigating environmental impacts, and it is in close proximity to the electrical grid. After reviewing locations in Colebrook and across the state that may be conducive to commercial wind, BNE believes that Wind Colebrook South is one of the best locations in the state for commercial wind. The site is located on high elevation property on a ridge at the top of one of the highest points in the town and has sufficient wind resources to provide fuel for commercial wind generation. Additionally, the three wind turbines proposed by BNE will be located on 80 acres, adjacent to hundreds of acres of conservation property and a gun club. While there are a few homes near the project, BNE has provided for appropriate setbacks from residential properties to ensure safe and reliable operations. It is also important that the turbine locations are close to the grid to minimize interconnection costs which can be substantial, and to also minimize environmental impact in connecting to the grid. In addition, the Site is located in a mixed use area of residents and businesses located on Route 44 which is the main road in Colebrook. Next to the site is a gun club, golf driving range, and a private park with outdoor recreational facilities. Wind turbines are being built in communities throughout New England near schools, churches and homes. BNE believes that Wind Colebrook South is an excellent location for one of the first commercial wind farms in Connecticut.

Q4. How many residences are located within 2,000 feet of the property on which Wind Colebrook South would be located?

A4. There are a total of twenty-nine (29) residences located within 2,000 feet from the Property boundary on which Wind Colebrook South would be located. There are a total of nineteen (19) residences within 2,000 feet of the proposed turbine locations.

Q5. Provide a cost estimate for the proposed project broken down by different component costs.

A5. The total cost of the project is estimated to be approximately $12,000,000, based on the installed cost of $2,500 per kW of installed capacity, which is a reasonable estimate for wind projects in New England. The cost of the wind turbines generally range between sixty-five to seventy percent of the total installed costs. Other major cost categories include development and permitting, balance of plant, interconnection costs and construction costs. Below is a figure of cost estimates by category for wind power development.[1] BNE believes the cost categories for Wind Colebrook South will be similar to those in the figure below.

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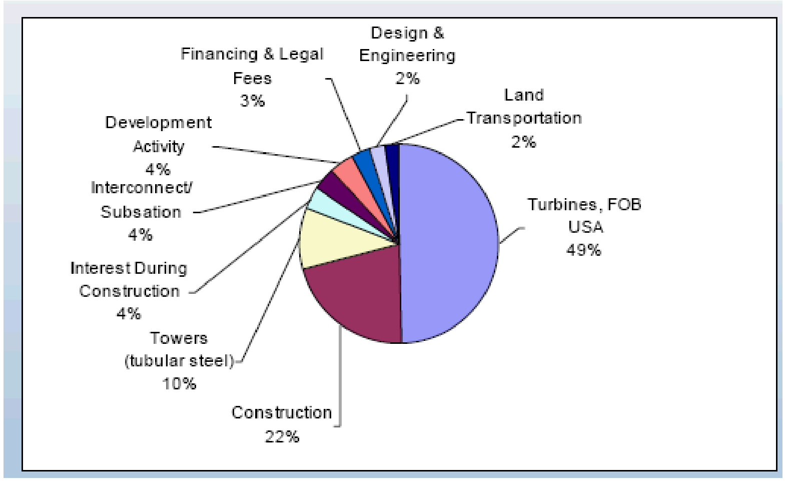
[1] "Fundamentals of Wind Energy," S. Butterfield, NREL, American Wind Energy Association Pre-Conference Seminar, May 15, 2005.



Q6. In Volume I of the Petition, page 27, the predicted sound levels are less at nighttime than daytime. Explain why.

A6. The maximum sound levels from the wind turbine are dependent upon the wind speed. The highest sound levels (106 dB) from the turbine will occur starting at a wind speed of 9 m/s, which was assumed for the daytime period. For the nighttime period, a wind speed of 8 m/s was assumed, which results in the sound level of 104 dB. The receptor sound levels will vary based upon the wind turbine noise source. The sound levels for the noise analysis were selected based upon the assumed wind speeds for the daytime and nighttime periods. It should be noted that if the nighttime wind speed were assumed to be 9 m/s, the highest sound level that the turbine could generate, the nighttime sound levels would increase by 1 or 2 dB, but none of them would exceed the nighttime residential impact criteria for a Class C noise emitter.

Q7. Provide the addresses of the residential properties identified as R1 through R8 in the Sound Level Calculations included as part of the Noise Evaluation (Volume 3, Exhibit M).

A7. The addresses of the residential properties identified as R1 through R8 in the Sound Level Calculations included as part of the Noise Evaluation (Volume 3, Exhibit M) are included in the table below:

Colebrook South Receptors	*Address*	*Town*	*Map/Block/Lot*
R1	177 Winsted-Norfolk Road	Colebrook	7-2
R2	1 Greenwoods Turnpike	Colebrook	7-15
R3	17 Flagg Hill Road	Colebrook	1-6-1
R4	29A Flagg Hill Road	Colebrook	1-4
R5	47 Flagg Hill Road	Colebrook	1-1
R6	129 Skinner Road	Winchester	007/155/016X-4
R7	319 Beckley Road	Norfolk	4-08 8
R8	131 Beckley Road	Norfolk	4-08 4

Q8. Explain how BNE determined that the host property is a Class C noise emitter for its Noise Evaluation.

A8. While the Property is zoned residential, its proposed use as a wind generation facility is best characterized as utility service within a Class C Land Use Category as provided by the Regulations of state agencies RSA Sec. 22a-69-2.5. The Property is located in a mixed land use area and is next to several businesses including a gun club, golf driving range, and a private park with outdoor recreational facilities. See Class C Land Use Categories below.

> **Sec. 22a-69-2.5.**
> **Class C Land Use Category.** The land uses in this category shall include, but not be limited to, manufacturing activities, transportation facilities, warehousing, military bases, mining, and other lands intended for such uses.
>
> The specific SLUCONN categories in Class C shall include:
> 2. Manufacturing – Secondary Raw Materials
> 3. Manufacturing – Primary Raw Materials
> 4. Transportation, **Communications and Utilities** - Except 46 and 47
> 6. Services
> 637 Warehousing and Storage Services
> 66 Contract Construction Services
> 672 Protective Functions and Related Activities
> 675 Military Bases and Reservations
> 8. Agriculture
> 83 Forestry Activities and Related Services
> 84 Commercial Fishing Activities and Related Services
> 85 Mining Activities and Related Services
> 89 Other Resource Production and Extraction, N.E.C. *
> *Not Elsewhere Classified
> (Effective June 15, 1978)
>
> ***Emphasis added***

Q9. Did BNE take any existing noise level measurements on the host property or near the immediately surrounding properties identified in its noise evaluation for the Wind Colebrook South project? If so, what were the results?

A9. The existing sound levels in the vicinity of the project site were established by conducting noise monitoring at two locations, which include the neighborhood of Flagg Hill Road to the southeast of the site and Beckley Road to the southwest. These measured sound levels ranged from 37 dB (A) to 38 dB(A).

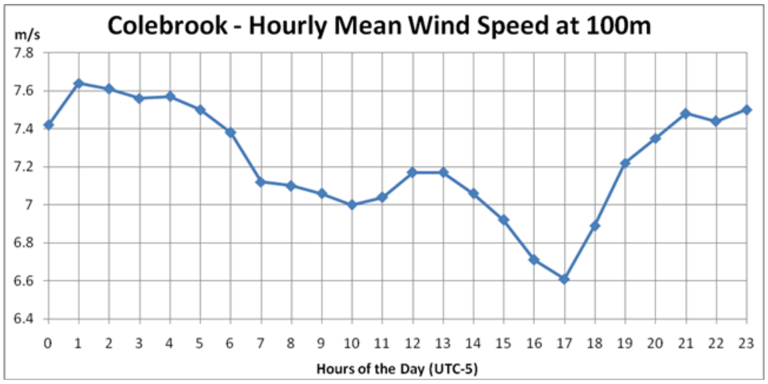
Q10. Provide any noise specifications for the GE turbines BNE has selected for the Wind Colebrook South project.

A10. See the Noise Emission Characteristics for the GE 1.6 MW wind turbines; this document is being filed separately pursuant to a motion for protective order.

Q11. On page 7 of Exhibit M, the Noise Evaluation, it is stated that the project generated sound levels are based on an assumed daytime wind speed of 9 m/s and a nighttime wind speed of 8 m/s. Please explain the basis for selecting these wind speeds.

A11. The highest sound levels that the wind turbine could generate will occur at a wind speed of 9 m/s, or greater. The noise analysis assumed a wind speed of 9 m/s for the daytime period as a worst case condition. The noise analysis used a wind speed of 8 m/s for the nighttime based upon average actual wind data at the site. Wind data was collected at the site covering nearly 14 months, ranging from December 12, 2008 to January 24, 2010. Although the data indicates that there could be maximum wind speeds at night exceeding 8 m/s on occasions, the average nighttime annual wind speeds are in the range of 6.9 to 7.6 m/s at 100 meters. Therefore, using 8 m/s for the nighttime noise analysis predicts what we feel would be typical sound levels that could occur during nighttime conditions.

The wind data is presented below in a graph showing the **one day average** of the 13.4 month measured wind data at a height of 100 meters.



Q12. Is there an industry-adopted engineering standard to which wind turbines are normally built? If so, what is this standard?

A12. GE has over 15,000 turbines in operation; they operate safely and reliably with an availability expected to exceed 98%. The proposed unit is one of the world's most widely-used wind turbines in its class with operation in 19 countries, 170+ million operating hours and 100,000+ gigawatt-hours (GWh) produced. GE's design includes a reinforced tower design to enable reliable and safe operation that meets product and regulatory compliance expectations. See the technical specifications of the GE 1.6 MW turbine; this information is being filed separately pursuant to a motion for protective order.

Q13. Does the turbine fall zone remain within the subject property boundaries? If no, indicate by how many feet the fall zone extends beyond the subject property boundaries.

A13. BNE is following GE's recommended setbacks for wind turbines adjacent to uninhabited land to ensure that the rotor blades are entirely on BNE property. GE's wind turbines are extremely safe and reliable. See response to Q12 above. The closest proposed turbine to an adjacent property boundary is 145 feet. Therefore, the height of the fall zone for the closest turbine would extend beyond the subject property by 183 feet and 317 feet for the tower and tip height, respectively.

Q14. Are there any industry-accepted guidelines for the minimum amount of acreage required per wind turbine? If so, what are these guidelines?

A14. Individual wind turbines do not take up much land and the footprint can comprise less than one acre post construction. As a result, turbines can and have been located in very close proximity to schools, churches and homes throughout New England, and elsewhere. However, when there is more than a single turbine at a particular location, they must be appropriately spaced to avoid turbulence. Groups or rows of wind turbines should be positioned for optimum exposure to the prevailing winds while accounting for the topographical characteristics of the site. Sufficient spacing is necessary to maximize electricity production while minimizing exposure to damaging the turbines caused by turbulence from the rotors. Appropriate spacing varies as a function of the turbine size, rotor diameter and the wind resource characteristics on the site. A general rule of thumb in the industry is one turbine per sixty acres to provide adequate spacing for the turbines. The general rule is applied in areas with vast amounts of open land, such in Texas or on farms in the mid-west. The actual amount of land occupied by each turbine, often referred to as its "footprint," is much smaller and often less than one acre per turbine. The rule of thumb is only a general rule. Numerous factors must be analyzed for the specific placement of turbines on a site. As indicated in the response to Q4 above, BNE spent considerable time and resources to determine the optimal location of the turbines on the site. In addition, GE conducted an extensive Mechanical Loads Assessment that analyzed numerous factors such as wind speed, air density and turbulence intensity to determine if the locations of the turbines are suitable for the site. Other factors such as appropriate setbacks and wetland impacts were also considered. As a result, BNE has determined, with considerable input from GE, that three GE 1.6 MW wind turbines with 82 meter diameter blades may be sited on the Property as proposed.

Q15. Describe the normal maintenance schedule for the turbines selected by BNE.

A15. BNE expects to enter into an operations and maintenance agreement with GE, and plans to implement standard routine maintenance as recommended by the turbine manufacturer to ensure safe and reliable service. Wind turbine availability for the GE 1.6-82.5 MW wind turbine is expected to exceed 98 percent.

Q16. At what wind speed would the proposed blades begin producing electricity? Provide similar data based on 100 meter diameter blades?

A16. The cut in speed, or the speed at which the blades would begin to produce electricity, for the GE 1.6-82.5 model is 3.5 m/s. Similarly, the cut in speed for the GE 1.6-100 model is also 3.5 m/s. However, the power curve of the GE 1.6-100 is greater than that of the GE 1.6-82.5 turbine model and would therefore result in a greater annual production of electricity on the site. See the power curves for the two GE 1.6 MW wind turbine models; this information is being filed separately pursuant to a motion for protective order.

Q17. Provide a shadow flicker analysis that estimates the number of hours per year this condition may occur, and the extent to which the effects may be discerned.

A17. See Shadow Flicker Report, attached hereto as Exhibit 3.

Q18. Provide an estimate of the total area to be cleared for the project, including turbine sites, laydown areas, access roads, and electrical collector yard.

A18. The total area to be cleared for the project, including turbine sites, laydown areas, access roads, and electrical collector yard is estimated to be 11.32 acres.

Q19. Estimate the number of trees with diameters at breast height of six inches or more that would be cleared for the project.

A19. Trees greater than 6" diameter at breast height within the clearing limits were marked with blue paint and the location, diameter and species data was collected using a GPS receiver utilizing available real-time Satellite-Based Augmentation System (WAAS) corrections with an ultimate expected horizontal accuracy of less than one meter. A total of 1,479 trees were tallied. The location of these trees will be provided within the final plans during the Development and Management phase of the Project.

Q20. Would the laydown areas be allowed to revegetate after the turbines are installed?

A20. The laydown areas will be planted with New England Conservation/Wildlife seed mixture supplied by New England Wetland Plants, Inc., as shown on plan sheets C-315, C-316, and C-317. This seed mixture will provide a permanent cover of native grasses, wildflowers and legumes designed to provide good erosion control and wildlife habitat value.

Q21. Approximately how many megawatt hours in a year would the proposed project have to generate in order to be commercially viable? How many hours of operation does this number represent?

A21. Commercial viability of a wind project is dependent on many factors including, but not limited to, wind turbine costs, regulatory requirements, construction costs, the price of electricity and related components, and the amount of electricity generated by the wind turbines. BNE is targeting a capacity factor of 30 percent for Wind Colebrook South, and believes the Project as proposed is commercially viable. The wind turbines are expected to be available greater than 98 percent of the time for the production of electricity. A 30 percent capacity factor will result in an annual energy yield of 12,614 MWh[2] of electricity production by the Project.

Q22. Volume 1, page 11 of the Petition discusses emissions offsets. Please provide the basis for the estimates of emissions reductions of air pollutants compared to fossil-fueled generation, including assumptions regarding fuel mix, emission factors, and capacity.

A22. The environmental value to the Colebrook community is significant and will be long lasting. Based on the output from three 1.6 MW facilities at a capacity factor of 30 percent, approximately 12,614 MWh of Class I renewable energy would be generated annually. The generation would provide the following reduction of air pollutants by offsetting the need for conventional fossil fueled generation:

3,532 (lbs/yr) total nitrogen oxides reduction

7,190 (lbs/yr) total sulfur oxides reduction

6,332 tons or 12,664,858 (lbs/yr) total carbon dioxide (greenhouse gas)

The renewable energy without carbon emissions would be equivalent to the following:

1,731 cars taken off the road

21,069 barrels of oil not combusted for electric generation

232,299 tree seedlings grown for 10 years

1,932 acres of pine or fir forest

Calculations:

The project is expected to produce 12,614 MWh, annually. The calculation for the productivity of BNE Wind Colebrook South is as follows:

MWh produced = 4.8 MW * 8,760 hours/year * 30% capacity factor (C.F.) = 12,614.

Emissions Benefits Analysis

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[2] 12,614 MWh is calculated as follows: 4.8 MW of installed capacity x 8,760 hours per year x 30% capacity factor. The capacity factor takes into account wind turbine availability.

Emission estimates were calculated and based on ISO-New England's 2007 Marginal Emissions Rate Analysis,[3] summarized below, with the "…weighted average emission rates of generating units that would typically increase their output if regional energy demands were higher…."[4] For the purposes of this analysis, the annual average of all hours was used:

NOx	0.28	lbs/MWh
SO2	0.57	lbs/MWh
CO2	1004	lbs/MWh

Given the 12,614 MWh of projected output, the emissions calculations are as follows:

Total Avoided NOx Emissions = .28 lbs/MWh * 12,614 MWh = 3,532 lbs

Total Avoided SO2 Emissions = .57 lbs/MWh * 12,614 MWh = 7,190 lbs

Total Avoided CO2 Emissions = 1,004 lbs/MWh * 12,614 MWh = 12,664,456 lbs or 6,332 tons

CO2 equivalencies (listed below) are based on the US Environmental Protection Agency Greenhouse Gas Equivalencies Calculator:[5]

- cars taken off the road - 1,731
- barrels of oil not combusted for electric generation – 21,069
- number of tree seedlings grown for 10 years – 232,299
- acres for carbon sequestered annually by pine or fir forests – 1,932

Calculations and references from this calculator are as follows:

Electricity use (kilowatt-hours)

The Greenhouse Gas Equivalencies Calculator uses the Emissions & Generation Resource Integrated Database (eGRID) U.S. annual non-baseload CO_2 output emission rate to convert reductions of kilowatt-hours into avoided units of carbon dioxide emissions. Most users of the Equivalencies Calculator who seek

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[3] http://www.iso-ne.com/genrtion_resrcs/reports/emission/2007_mea_report.pdf.

[4] Calculations subject to rounding.

[5] **Notes:** This calculation does not include any greenhouse gases other than CO2 and does not include line losses. Individual subregion non-baseload emissions rates are also available on the eGRID Web site. To estimate indirect greenhouse gas emissions from electricity use, please use Power Profiler or use eGRID subregion annual output emission rates as a default emission factor (see eGRID2007 Version 1.1 Year 2005 GHG Annual Output Emission Rates (PDF). **Sources:** (EPA 2009) eGRID2007 Version 1.1, U.S. annual non-baseload CO2 output emission rate, year 2005 data U.S. Environmental Protection Agency, Washington, DC.

equivalencies for electricity-related emissions want to know equivalencies for emissions **reductions** from energy efficiency or renewable energy programs. These programs are not generally assumed to affect baseload emissions (the emissions from power plants that run all the time), but rather non-baseload generation (power plants that are brought online as necessary to meet demand).

Emission Factor

7.18×10^{-4} metric tons CO_2 / kWh
(eGRID2007 Version 1.1, U.S. annual non-baseload
CO_2 output emission rate, year 2005 data)

Passenger vehicles per year

Passenger vehicles are defined as 2-axle 4-tire vehicles, including passenger cars, vans, pickup trucks, and sport/utility vehicles.

In 2007, the weighted average combined fuel economy of cars and light trucks combined was 20.4 miles per gallon (FHWA 2008). The average vehicle miles traveled in 2007 was 11,720 miles per year.

In 2007, the ratio of carbon dioxide emissions to total emissions (including carbon dioxide, methane, and nitrous oxide, all expressed as carbon dioxide equivalents) for passenger vehicles was 0.977 (EPA 2009).

The amount of carbon dioxide emitted per gallon of motor gasoline burned is $8.89 * 10^{-3}$ metric tons, as calculated in the "Gallons of gasoline consumed" section.

To determine annual greenhouse gas emissions per passenger vehicle, the following methodology was used: vehicle miles traveled (VMT) was divided by average gas mileage to determine gallons of gasoline consumed per vehicle per year. Gallons of gasoline consumed was multiplied by carbon dioxide per gallon of gasoline to determine carbon dioxide emitted per vehicle per year. Carbon dioxide emissions were then divided by the ratio of carbon dioxide emissions to total vehicle greenhouse gas emissions to account for vehicle methane and nitrous oxide emissions.

Calculation[6]

$8.89*10^{-3}$ metric tons CO_2/gallon gasoline * 11,720 VMT $_{\text{car/truck average}}$ * 1/20.4 miles per gallon $_{\text{car/truck average}}$ * 1 CO_2, CH_4, and N_2O/0.977 CO_2 = **5.23 metric tons CO_2E /vehicle/year**

Barrels of oil consumed

Average heat content of crude oil is 5.80 million btu per barrel (EPA 2007). Average carbon coefficient of crude oil is 20.33 kg carbon per million btu (EPA 2007). Fraction oxidized is 100 percent (IPCC 2006).

Carbon dioxide emissions per barrel of crude oil were determined by multiplying heat content times the carbon coefficient times the fraction oxidized times the ratio of the molecular weight of carbon dioxide to that of carbon (44/12).

Calculation[7]

5.80 mmbtu/barrel * 20.33 kg C/mmbtu * 44 g CO_2/12 g C * 1 metric ton/1000 kg = **0.43 metric tons CO_2/barrel**

Number of tree seedlings grown for 10 years

A medium growth coniferous tree, planted in an urban setting and allowed to grow for 10 years, sequesters 23.2 lbs of carbon. This estimate is based on the following assumptions:

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[6] **Note:** Due to rounding, performing the calculations given in the equations below may not return the exact results shown. **Sources:** EPA (2009). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007. Chapter 3 (Energy), Tables 3-12, 3-13, and 3-14. U.S. Environmental Protection Agency, Washington, DC. U.S. EPA #430-R-09-004 (PDF); FHWA (2008). Highway Statistics 2007. Office of Highway Policy Information, Federal Highway Administration. Table VM-1.

[7] **Note:** Due to rounding, performing the calculations given in the equations below may not return the exact results shown. **Sources:** EPA (2007). Inventory of U.S. Greenhouse Gas Emissions and Sinks: Fast Facts 1990-2005. Conversion Factors to Energy Units (Heat Equivalents) Heat Contents and Carbon Content Coefficients of Various Fuel Types. U.S. Environmental Protection Agency, Washington, DC. USEPA #430-R-07-002 (PDF); IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change, Geneva, Switzerland.

The medium growth coniferous trees are raised in a nursery for one year until they become 1 inch in diameter at 4.5 feet above the ground (the size of tree purchased in a 15-gallon container).

The nursery-grown trees are then planted in a suburban/urban setting; the trees are not densely planted.

The calculation takes into account "survival factors" developed by U.S. DOE (1998). For example, after 5 years (one year in the nursery and 4 in the urban setting), the probability of survival is 68 percent; after 10 years, the probability declines to 59 percent. For each year, the sequestration rate (in lb per tree) is multiplied by the survival factor to yield a probability-weighted sequestration rate. These values are summed for the 10-year period, beginning from the time of planting, to derive the estimate of 23.2 lbs of carbon per tree.

Please note the following caveats to these assumptions:

While most trees take 1 year in a nursery to reach the seedling stage, trees grown under different conditions and trees of certain species may take longer – up to 6 years.

Average survival rates in urban areas are based on broad assumptions, and the rates will vary significantly depending upon site conditions.

Carbon sequestration is dependent on growth rate, which varies by location and other conditions.

This method estimates only direct sequestration of carbon, and does not include the energy savings that result from buildings being shaded by urban tree cover.

To convert to units of metric tons CO_2 per tree, we multiplied by the ratio of the molecular weight of carbon dioxide to that of carbon (44/12) and the ratio of metric tons per pound (1/2204.6).

Calculation[8]

23.2 lbs C/tree * (44 units CO_2 / 12 units C) * 1 metric ton / 2204.6 lbs = **0.039 metric ton CO_2 per urban tree planted**

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[8] **Note:** Due to rounding, performing the calculations given in the equations below may not return the exact results shown. **Sources:** U.S. DOE (1998). Method for Calculating Carbon Sequestration by Trees in Urban and Suburban Settings. Voluntary Reporting of Greenhouse Gases, U.S. Department of Energy, Energy Information Administration.

Acres of pine or fir forests storing carbon for one year[9]

Growing forests store carbon. Through the process of photosynthesis, trees remove CO_2 from the atmosphere and store it as cellulose, lignin, and other compounds. The rate of accumulation is equal to growth minus removals (i.e., harvest for the production of paper and wood) minus decomposition. In most U.S. forests, growth exceeds removals and decomposition, so there has been an overall increase in the amount of carbon stored nationally.

The estimate of the annual average rate of carbon accumulation is based on two studies, one on Douglas fir in the Pacific Northwest (Nabuurs and Mohren, 1995), and the other on slash pine in Florida (Shan et al., 2001). These two studies represent commercially important species from different regions and with different rotation periods (i.e., time between planting and harvesting). The calculations below include both above-ground and below-ground carbon stored in these two species of plantation trees. They do not include litter or soil carbon.

Calculation for Slash Pine

The calculation uses the Gain Loss method, as outlined in the 2006 IPCC Guidelines, in order to estimate carbon stored annually per hectare in the slash pine plantation system described in the Shan et al. paper. The general equation for this method is shown below. Here, carbon losses due to harvested wood products, firewood foraging, and other sources of wood removals are assumed to be zero.

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[9] **Sources:**

Nabuurs, G.J., and G.M.J. Mohren. 1995. Modelling analysis of potential carbon sequestration in selected forest types. Canadian Journal of Forest Research 25(7):1157-1172.

Shan, J.P., L.A. Morris, and R.L. Hendrick. 2001. The effects of management on soil and plant carbon sequestration in slash pine plantations. Journal of Applied Ecology 38(5):932-941.

IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. Volume 4. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html.

$$\Delta CB = \Delta CG - \Delta CL$$

Where:
ΔCB = annual change in carbon stocks in biomass for each land sub-category, considering the total area, metric tons of carbon per year
ΔCG = annual increase in carbon stocks due to biomass growth for each land sub-category, considering
the total area, metric tons of carbon per year
ΔCL = annual decrease in carbon stocks due to biomass loss for each land sub-category, considering the
total area, metric tons of carbon per year (Here assumed to be 0).

Gains:

$$\Delta CG = \Sigma(Ai,j*Gtotali,j*CFi,j)$$

Where:
Gtotal = Σ (Gw*(1+R)
A = area of land remaining in the same land-use category, here assumed to be 1
Gtotal= mean annual biomass growth
i = ecological zone
j = climate domain
CF = carbon fraction of dry matter

Gw = average annual above-ground biomass growth for a specific woody vegetation type
R = ratio of below-ground biomass to above ground biomass for a specific vegetation type.

Since this paper measured growth in a plantation of trees harvested at age 17, the value is for relatively young trees that are growing more quickly than older trees would. The paper included several options in terms of management. The value used in the calculations below is the "control" – meaning that there was no fertilization (which had a big impact on growth) and no trimming of the understory for these trees. The calculation below uses the IPCC assumption that the carbon fraction is 47 percent of dry biomass.

The final result (3.052 MT C/ha/yr) * 0.4048 hectares/acre = **1.24 MT C/acre/year.**

	Reference	Aboveground biomass growth rate (MT/ha/yr) (averaged over 17 years)	Root:Shoot ratio (R)	Total Biomass Growth Rate (MT/ha/yr)	Carbon Fraction (MT C per MT dry matter)	Net Sequestration Rate (MT C/ha/yr)
Slash Pine, age 17	Shan et al 2001	5.209	0.2912	6.493	0.47	3.052

Calculation for Douglas Fir

This calculation is based on results found in a 1995 paper by Nabuurs et al. The paper uses a model to calculate the amount of carbon sequestered in plots of various tree types across the world. The model uses turnover rates in order to calculate carbon stored in forests over time during different types of logging intervals. Parameters included in the model include basic wood density, allocation of net primary production, turnover rates of tree organs, resident times of litter and humus, current volume increment, and allocation of harvested wood. The parameters are specific for each of the six sites chosen for the study. Within each site, three areas of fertility and production are measured, although the study uses sample data from the "moderate" site during the discussion and results sections. The numbers presented below are also from the "moderate" site.

Since this paper is concerned with carbon sequestered in forests undergoing selective logging, the designers of this calculator had to choose at what point during the harvesting cycle to measure the carbon sequestered. We decided to use the total carbon stock stored (including biomass and forest products, not including soil carbon) after 100 years of accumulation. The model in this paper assumes that the carbon fraction is 50 percent.

		Total C Stock After 100 Years (Mg C per ha)	Net Sequestration Rate (MT C/ha/yr)
Douglas-Fir, age 100	**Nabuurs et al 1995**	327	3.27

The final result (3.27 MT C/ha/yr) * 0.4048 hectares/acre = **1.32 MT C/acre/year.** One reason why this value is higher than the slash pine plantation number is because the Douglas fir trees had 100 years to accumulate biomass – including more years at a relatively fast-growing maturity than the slash-pine trees.

The average of these two values is 1.28 metric tons of C per acre per year, which corresponds to **4.69 metric tons of CO_2 per acre of pine or fir forests.**

Q23. What is the maximum distance that ice could be thrown from the proposed wind turbines? Provide the detailed calculations. How many homes are located within this distance?

A23. BNE has retained Garrad Hassan American Inc. to conduct a detailed ice throw study to accurately respond to this interrogatory. The study will be filed as soon as it is completed on or before the March 15, 2011 pre-filing deadline.

Q24. How does BNE intend to monitor the facility for ice build up on the blades and potential ice throw? What could be done if ice does begin to build up on the blades?

A24. The proposed 1.6-82.5 GE turbine has controls that monitor multiple inputs and outputs. If ice builds up on the blades, the turbine monitors the actual output compared to the expected output. If the actual output falls below where it should be based on wind speed, the turbine will alarm to notify the operator that icing may be occurring. There are also vibration monitors which can detect uneven accumulation of ice, and safely shut down the turbine. There is also an optional feature called Winter Ice Operation Mode which could be used to automatically reduce turbine output during icing conditions, to increase output. The wind turbines will also be remotely monitored by GE and will be monitored by BNE onsite during icing conditions to ensure safe operation.

Q25. What is the approximate distance that parts of the blades could be thrown from a turbine? Provide such calculations. How many residences are located within this distance?

A25. GE has over 15,000 turbines in operation; they operate safely and reliably. The proposed unit is one of the world's most widely-used wind turbines in its class with operation in 19 countries, 170+ million operating hours and 100,000+ gigawatt-hours (GWh) produced. Variable speed control and independent blade pitch will be used for aerodynamic braking to reduce blade speed during high winds. The reinforced tower design will enable reliable and safe operation that meets product and regulatory compliance expectations up to operational maximum extreme gusts for a three second period of 56 m/s (over 125 mph) and for ten minutes of 40 m/s (over 89 mph) according to IEC standards. The wind turbine machine can be controlled automatically or manually from either an interface located inside the nacelle or from a control box at the bottom of the tower. Control signals can also be sent from a remote computer via a SCADA. BNE expects to enter into an operations and maintenance agreement with GE to remotely monitor and maintain the turbines. BNE operations and maintenance personnel will also be located on-site to supplement the services provided by GE. Service switches at the tower top prevent service personnel at the bottom of the tower from operating certain systems of the turbine while service personnel are in the nacelle. To override any machine operation, emergency stop buttons located in the tower base and in the nacelle can be activated to stop the turbine in the event of an emergency. The rotor blades are also equipped with lightning receptors mounted in the blade and the turbines are grounded and shielded to protect against lightning. The turbines are also specially built to handle seismic loads. In the rare instance that a blade is damaged, the setbacks proposed by BNE would provide more than an adequate safety zone for any type of malfunctions of the turbines.

Q26. Did BNE make any attempts to determine the presence of raptors in the vicinity of the project area? If so, what were the results of these attempts?

A26. Identification of raptors was attempted as part of the Breeding Bird Survey at Colebrook South, however, survey methodology was not designed to maximize detection of raptors. No raptors were observed during formal Breeding Bird Surveys. Surveyors completing Breeding Bird Surveys and Acoustic Bat Monitoring at Colebrook South recorded any raptors seen incidentally while on site. A total of 2 red-shouldered hawks and 2 broad-winged hawks were recorded incidentally.

Q27. Is the Wind Colebrook South project located near any Important Bird Areas designated by the Connecticut Audubon Society?

A27. A total of 27 IBAs have been identified in Connecticut (Audubon Connecticut 2010). There are currently no IBAs in the Northwest Highlands Region of the state. There are three IBAs in the Southwest Hills area of Litchfield County: Topsmead State Forest in Litchfield, White Memorial Foundation in Litchfield and Morris, and Good Hill Farm Sanctuary in Woodbury and Roxbury.

Respectfully Submitted,

By:/s/ Carrie L. Larson
Attorney For BNE Energy Inc.
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Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702
Ph. (860) 424-4312
Fax (860) 424-4370

Certification

This is to certify that a copy of the foregoing has been sent via Federal Express on this date to all parties and intervenors of record.

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11 School Street
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East Granby, CT 06026

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Benjamin C. Mow
12A Greenwoods Turnpike
Colebrook, CT 06021

/s/ Carrie L. Larson
Carrie L. Larson

EXHIBIT 1

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
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1. Article Addressed to:

The Northwestern Connecticut
Sportsman Association, Inc.
PO Box 618
Winsted, CT 06098

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)

C. Date of Delivery

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1. Article Addressed to:

Carole Marchetti
36 Edgewater Drive
Old Greenwich, CT 06870

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)
R C

C. Date of Delivery
11-20-10

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Robin L. Dziedizic
29A Flagg Hill Road
Winsted, CT 06098

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

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1. Article Addressed to:

Mark & Mary Mataraimen
45 Flagg Hill Road
Winsted, CT 06098

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Mary Mat ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number
(*Transfer from service label*) 7009 2820 0002 1698 1346

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1. Article Addressed to:

State of Connecticut
DEP
79 Elm Street
Hartford, CT 06106

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number
(*Transfer from service label*) 7009 2820 0002 1698 1308

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Bank of America
4161 Piedmont Parkway
Greensboro, NC 27410

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Mark ☐ Agent ☐ Addressee

B. Received by (*Printed Name*)
Mark

C. Date of Delivery
11-29

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number
(*Transfer from service label*) 7009 2820 0002 1698 1278

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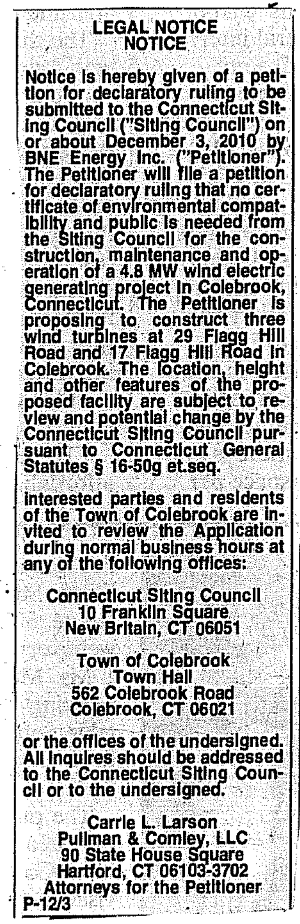
EXHIBIT 2

THE LITCHFIELD COUNTY TIMES

65 Main St. New Milford, CT 06776
(860) 354-2261 • Fax (860) 210-2150

Affidavit of Publication

State of Connecticut County of Litchfield



LEGAL NOTICE
NOTICE

Notice is hereby given of a petition for declaratory ruling to be submitted to the Connecticut Siting Council ("Siting Council") on or about December 3, 2010 by BNE Energy Inc. ("Petitioner"). The Petitioner will file a petition for declaratory ruling that no certificate of environmental compatibility and public is needed from the Siting Council for the construction, maintenance and operation of a 4.8 MW wind electric generating project in Colebrook, Connecticut. The Petitioner is proposing to construct three wind turbines at 29 Flagg Hill Road and 17 Flagg Hill Road in Colebrook. The location, height and other features of the proposed facility are subject to review and potential change by the Connecticut Siting Council pursuant to Connecticut General Statutes § 16-50g et.seq.

Interested parties and residents of the Town of Colebrook are invited to review the Application during normal business hours at any of the following offices:

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Town of Colebrook
Town Hall
562 Colebrook Road
Colebrook, CT 06021

or the offices of the undersigned. All inquires should be addressed to the Connecticut Siting Council or to the undersigned.

Carrie L. Larson
Pullman & Comley, LLC
90 State House Square
Hartford, CT 06103-3702
Attorneys for the Petitioner
P-12/3

Sabina J Paskowski being duly swor deposed and says that he/she is an employee of **The Litchfiel County Times**, a weekly newspaper, published in the Town New Milford, County of Litchfield, in the State of Connecticut, an that a notice, a printed copy of which is hereunto annexed, ha been published in said newspaper, on the 3rd day December, 20 10.

Sabina J Paskowski

Sworn and subscribed to before me on this 22nd day of Febru, 20 11.

State of Connecticut Notary Public or other official authorized to administrator oaths.

HEIDI J. HAUG

Date commission expires July 31, 2013

EXHIBIT 3

Exhibit 3 contains a photographic file that was too large to e-mail. A copy has been provided to the Siting Council on disk with the physical filing.