STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petitions of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of 4.8 MW Wind Renewable Generating Projects on Flagg Hill Road in Colebrook, Connecticut ("Wind Colebrook South") and Winsted-Norfolk Road in Colebrook, Connecticut ("Wind Colebrook North")	**Petition Nos. 983 and 984** **March 15, 2011**

PRE-FILED TESTIMONY OF DAVID PRESSMAN

I. Introduction

Q1. Please state your name and occupation.

A1. My name is David Pressman. I am an Analyst at Energy Ventures Analysis in Arlington, VA. As part of my job responsibilities, I evaluate the impact of Federal and State energy policy on fossil fuel demand, renewable energy technology growth, power plant development and the broader energy market. I track Renewable energy capacity development and generation growth by region and evaluate changing capital costs and financing structures for renewable and conventional projects. My resume is attached as Exhibit 1.

Q2. On whose behalf are you submitting testimony?

A2. I am submitting testimony on behalf of FairwindCT, Inc., Susan Wagner and Stella and Michael Somers.

Q3. Have you testified in front of the Siting Council before?

A3. Yes, I submitted pre-filed testimony regarding Petition No. 980, in which BNE is seeking approval to site a similar project in Prospect, Connecticut.

Q4. Please describe the assignment you were given for this proceeding.

A4. I was asked to review the BNE's Colebrook North and South petitions and provide an independent opinion on the proposed site's wind resources and its claims of power output.

Q5. Please summarize your findings.

A5. My testimony covers five areas. My major findings discussed in my testimony are:

1. Connecticut utilities are interested in procuring the lowest cost qualifying renewable resources to meet their Renewable Portfolio requirements that can come from a broad region stretching from Maryland to Maine. The competitiveness of wind power as a renewable electricity source is heavily influenced by continuing governmental support (grants, production tax credits, state RPS, tax incentives) to offset their higher production costs and the wind project's capacity factor (since the vast majority of wind production costs are fixed capital and operating costs). Therefore, a wind project's projected capacity is a critical element in a wind plant's competitiveness. It should play an important role in the Connecticut Siting Council's criteria for determining if the facility provides ratepayers power at reasonable cost as required under Connecticut General Statute § 16-50g.

2. While BNE provided some summary data from its wind monitoring tower, no data was provided to develop an independent estimate of the project power output. Nor did the petition provide documentation for how its 10 percent loss assumptions were developed. Without these, we are left to making a comparison between historical performance of existing operating wind projects to the BNE's

30 percent capacity factor performance estimates for Colebrook Wind. Given that the existing wind projects are sited along much higher mountain ridges with better wind resources, I am unable to find independent support for BNE's claimed 30% capacity factor. As part of my testimony, I will detail how BNE has overstated its assumed 30% capacity factor by understating the impact of generation losses on project efficiency and power output. It is likely that both Colebrook South and North will have a capacity factor in the 22-26% percent range, and not 30% as BNE has assumed in its petition.

3. A review of Colebrook North's petition suggests there may be as little as 700 feet between two of Colebrook North's turbines. In the Colebrook South petition, there are approximately 1000 feet between turbines. Industry standards generally require distances of at least 4-5 rotor diameters between turbines. It appears there may be a distance as little as 1.5 rotor diameters for Colebrook North and 2.7 rotor diameters for Colebrook South. Siting turbines so closely to one another will increase wind turbulence between the two turbines, creating erratic and disruptive wind patterns that will adversely impact project operability and generation output. Generation losses due to wind turbulence and icing will be much higher than BNE's 10% assumption and likely be closer to 20%. These losses will have a significant impact on Colebrook's power output, and will increase the project's power production cost, which could result in higher power prices for Connecticut consumers.

4. BNE's Colebrook petition makes no discussion of project capital, operating and maintenance costs, and what impact these costs will have on consumers. Therefore, the Siting Council has no cost or pricing information to determine if

this project represents a competitive alternative for Connecticut utilities or other utilities seeking renewable energy.

5. Better options likely exist in Connecticut's effort to develop its renewable resources to meet its Class I Renewable Portfolio Standards (RPS). Other locations, especially along mountain ridges in New England offer better wind conditions. Many other proposed wind projects are able to offer better economies of scale. Finally, biomass projects with their much higher capacity factors that account for a much larger market share of the regional renewable market may also provide a more cost- competitive renewable resource for Connecticut ratepayers.

II. Colebrook and Connecticut's Wind Resources

Q6. BNE claims in its petition that the Colebrook site "is ideally suited for a wind generation project due to its elevation, orientation and topographical characteristics." How do the wind resources of the proposed Colebrook site compare to other potential wind sites in Connecticut and elsewhere around New England?

A6. In its petition, BNE claims that the site will offer 7.1 m/s average wind speeds at an altitude of 100 meters. BNE has not released its wind data for independent review. However, I am concerned about this claim, because the currently public available wind data does not support this claim. Not surprisingly, no wind projects have been erected in Connecticut since the state has relatively poor resources compared to the rest of New England. The best wind resource sites are generally located in northern New England, especially New Hampshire and Maine. According to the National Renewable Energy Laboratory (NREL), Connecticut wind speeds generally average 4-6 meters/second at 80m (see Exhibit 3). This includes the Colebrook site. While I realize that these maps are very generalized and local condition can vary, they still provide good insight on local trends and where the best wind resources can be found.

The Department of Energy (DOE) in its NEMS modeling, considers 7 m/s as the minimum avg. wind speed to warrant wind project development. As detailed in Exhibit 4, DOE classifies Connecticut's inland wind speeds as Class I-II, or "poor" or "marginal." Along Connecticut's southern coast, in the area between Stratford and the Massachusetts border, some areas have avg. wind speeds that average 6-7 m/s, which would be classified as "fair." (Exhibit 4). In Maine, as a means of comparison, there are numerous on-shore sites with average wind speeds of 6-7.5 m/s (Exhibit 6).

Off-shore wind speeds off the New England coast are consistently higher than on-shore. Off Connecticut's southern coast, the offshore winds average between 7-8 m/s, or what would be classified as Class III-V, or "Fair" to "Excellent." While it is difficult to accurately specific project output based on year-long testing, Connecticut's average wind speeds are marginal, and confirm why few wind developers look at Connecticut for potential projects.

III. <u>Wind Speed Testing and Data</u>

Q7. In its petitions, BNE projects that both Colebrook North and South are 4.8 MW projects that will operate at a 30% capacity factor, generating approximately 12,614 MWh of renewable energy annually. What kind of wind speed testing did BNE perform in developing its 30% capacity factor?

A7. In its filings, BNE has not provided any information as to how it developed its assumed 30% capacity factor. In its Wind Assessment, BNE states that after more than 13 months of testing with a meteorological tower, the mean wind speed at 60 meters was 6 m/s. Extrapolated to 80 meters, this equals 6.6 m/s, and at 100 meters, 7.1 m/s. This wind speed extrapolation estimates that a wind speed exponent of 0.33 was used in the calculation. This exponent is very high, especially given 0.14 is considered a typical value[1]. If this "typical" default value is applied to 100 meters, the wind speed would have been closer to 6.45 m/s, and the power output estimate would have been quite a bit less.

Q8. Where was the met tower located compared to the proposed Colebrook sites?

A8. The met tower was erected at a location that appears to be on the proposed Colebrook South site. BNE also used a sodar device located 95 meters northwest of the met tower. It does not appear BNE did any testing near the Colebrook North site, and simply used the wind data collected from the Colebrook South site in its Colebrook North capacity factor assumptions.

Q9. Is using a set of wind speed data taken at one site for wind output assumptions on another site accurate in providing good wind resource assessments?

A9. Both Colebrook South and North are located on ridgelines and are sited at higher elevations (1,470 feet for South and 1,300 feet for North). According to BNE, as the wind "travels through the valley corridor and is forced up a ridge, it accelerates as it merges with higher altitude winds where the turbines will be located . . . The wind acceleration increases wind shear and power density, which will in turn improve turbine performance." While Colebrook South and North appear to be similar sites, using the wind data collected at Colebrook South at the Colebrook North site would prove inaccurate, given the complexity of wind patterns as the wind rises from the valley and accelerates as it moves up the ridge. BNE assumes that Colebrook North and South will both have 30% capacity factors, but without any wind data from the Colebrook North site, it is impossible to substantiate this claim.

[1] In "Wind Energy Assessment and Ice Throw Analysis," a report analyzing wind resources for the Brodie Mountain wind project, RWDI AIR Inc. uses wind speed exponents of 0.10, 0.18 and 0.26 in their modeling. DISGEN, in their resource assessment for the same project, uses an average wind exponent value of 0.14, with a range of 0.05- 0.35.

IV. Turbine Location

Q10. In BNE's petitions, approximately how close has it decided to site Colebrook's turbines from each other?

A10. Colebrook North and South are located on smaller plots, 79.4 and 124.9 acres, respectively. On Exhibit F of Colebrook North's site plans, two of the turbines appear to be sited approximately 700 feet apart. While the petition notes that the drawings are not "necessarily scaled to their actual dimensions or locations on the drawings," no other engineering site plans have been made available. Assuming BNE decides to use GE's 1.6 MW 82.5 turbine (rotor diameter of 270 ft.), this would means that there are only 430 feet between turbines. In the Colebrook South petition, there are approximately 1000 feet between turbines. If rotor diameters are included, there would be only 730 feet between turbines. Industry standards generally require distances of at least 4-5 rotor diameters between turbines. It appears there may be a distance as little as 1.5 rotor diameters for Colebrook North and 2.7 rotor diameters for Colebrook South.

Q11. Does BNE address the distance between the turbines at any point in its petitions?

A11. On page 7 of BNE's Colebrook wind assessment, BNE notes that this distance of two rotor diameter between turbines in one row, and goes on to state that a four rotor diameter is "recommended, however, for this project, and due to site limitations, *a smaller spacing was assumed with the understanding of negative impact on turbine power production performance*." (Emphasis added.)

Q12. What is the industry standard for the minimum distances that turbines should be sited from each other?

A12. A 2003 German wind study[2] suggests that wind turbines should be placed together not "closer than five diameter in the prevailing wind direction. Between three and five diameters it must be proved by specialist reports that the structural integrity is not affected."

Q13. Industry standards suggest that a distance of at least five rotor diameters separate wind turbines. If the distance is between only one and two rotor diameters, what impact will this have on the project?

A13. Even if GE's 1.6 MW (82.5 meter rotor) turbine is used, siting turbines so closely to one another will increase wind turbulence between the two turbines, creating erratic and disruptive wind patterns that will adversely impact project operability and generation output. The generation losses due to wind turbulence are likely to be much higher than the 10% loss figure provided in BNE's assumptions. Given that BNE fails to document how it develops its 10% loss deduction figure, I am concerned that it has underestimated project power losses.

Q14. BNE's petition assumes an average tree height of 65 feet. The proposed turbine, GE's 1.6 MW unit, has a hub height of 325 feet, while the rotor diameter extends 270 feet (82.5 meters). What is the difference in height between the bottom of the turbine's swept area and top of the tree line?

A14. Assuming usage of GE's 1.6 MW turbine, there would only be 128 feet between the bottom of the turbine's swept area and the tree tops. As is illustrated in Exhibit 7, EVA calculated this number by subtracting the half of the span of the 270 ft. rotor diameter (135 feet) from the hub height (328 feet). There is a 193 foot difference between the bottom of the turbine's swept area and the ground. In its petition, the developers assume the tree tops extend an average

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[2] Recommendations for Spacing in Wind Farms, Henry Seifert, Jurgen Kroning. Paper presented at EWEC Madrid, Spain 17 June 2003.

of 65 feet in the air. When tree tops are included, there are only 128 feet from the bottom of the turbine's swept area to the top of the trees.

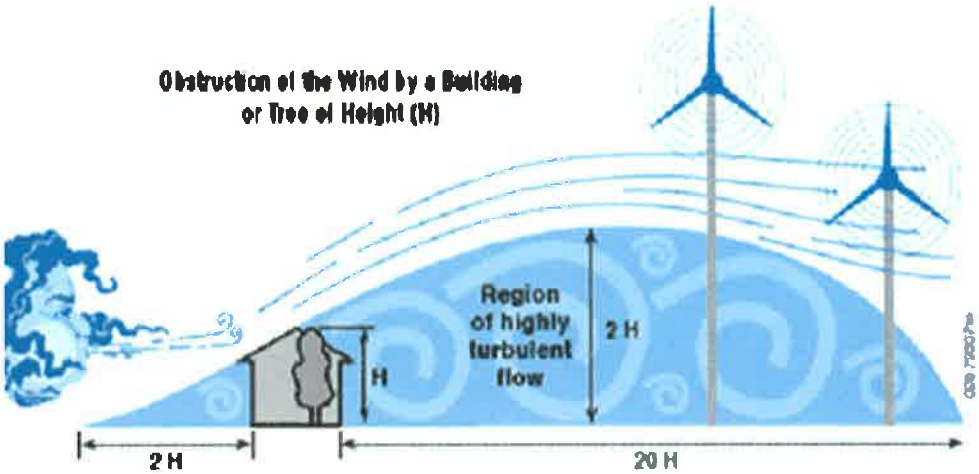
Q15. BNE has requested that a rotor diameter of 100 meters (328 feet) be approved. If BNE were to use a 328-foot rotor diameter, what would the distance be between the bottom of the swept area and tree tops?

A15. If a turbine with a 328-foot rotor diameter was used, there would only be 99 feet between the bottom of the turbine's swept area and the tree tops.

Q16. Why is the distance between the swept area and tree tops an issue?

A16. Wind turbines operate most efficiently when sited in wide open spaces where there is little turbulence, or high along mountain ridges where they are exposed to the most robust winds. While the Colebrook site is slightly elevated, the presence of high tree tops means that the wind will likely bounce off the trees and hit the turbine-swept areas in disruptive wind patterns, creating turbulence and further adversely impacting project output. That there is likely to be only 128 feet (or 99) between the bottom of the turbine's swept area and top of the tree line is another area that could create disruptive wind patterns and negatively impact project output. This is illustrated in the DOE graphic below.

Figure 1. Obstruction of the wind.



Source: http://www.windpoweringamerica.gov/pdfs/small_wind/small_wind_va.pdf.

V. Capacity Factor and Wind Output

Q17. Why is capacity factor so important in wind projects?

A17. Capacity factor indicates how efficiently a unit is being operated. It can be defined as Actual project output/Maximum Theoretical project output, or plant output as a percentage of its maximum theoretical output at its nameplate capacity operated at 8760 hours/year. Nuclear plants generally operate with a capacity factor in the 90-95% range, while coal and biomass plants generally operate in the 55-80% range. Natural gas units are flexible and can operate anywhere from the 10-80% range. These power units can be ramped up and down to compensate for fluctuations in electricity demand in a given day and hour.

Wind, like solar and some other renewables, is an intermittent resource, and cannot be dispatched depending on need. Wind's capacity factor is highly variable depending on location and wind resources, but generally sits in the 20-32% range, with some projects in high wind areas (parts of the Midwest, offshore) reaching the 34-38% range. This slight difference in output is crucial, given wind production costs are dominated by fixed capital and operating costs. The more power a unit produces, the cheaper the cost per MWh is to produce power. (See Exhibit 2).

VI. Icing and Generation Deductions

Q18. What generation deduction losses have wind developers historically assumed in their wind models?

A18. In a 2006 Clipper Wind report, "The Economics of Wind Energy", Clipper assumes a generic 40% capacity factor for wind projects. However, they assume a 16.2% deduction in their assessment of wind project availability, bringing their capacity factor of 34.4%. While few wind projects currently operating in the United States have ever achieved a 34.4% factor, Clipper's assumptions toward generation deductions prove useful to examine for their applicability in the Colebrook project. They include:

Transformer/Line Losses/Transmission Line	-3.0%
Wake Losses	-4.8%
Control Algorithm/Turbulence	-1.6%
Blade Contamination	-1.5%
Icing	-1.0%
Turbulence	0.0%
Turbine Availability	-3.0%

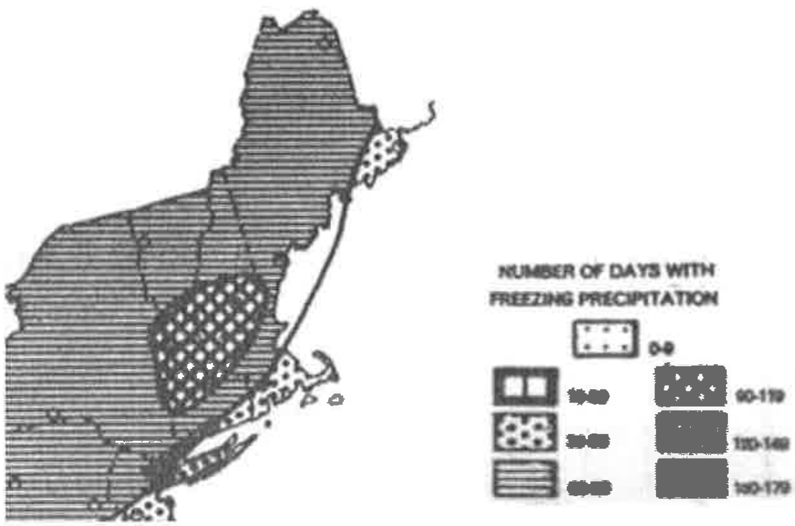
Q19. The generation losses due to icing seem quite low in Clipper's report. What might the icing losses likely be for the Colebrook project?

A19. One report, "Wind Energy: Cold Weather Issues[3]" states that "icing represents the most important threat to the integrity of wind turbines in cold weather . . . it was determined that icing weather can occur as much as 15% of the time between the months of December and

[3] Wind Energy: Cold Weather Issues. Dr. James Manwell, Antoinne LaCroix, UMass Amherst Renewable Energy Research Laboratory. June 2000.

March." The study cites a historical report that the Colebrook, Connecticut area has historically seen 9-11 days of freezing precipitation annually. (See Figure 2). Given that this icing occurs during the periods of greatest average wind speeds, the losses on an average basis are magnified.

Figure 2. Total number of days with freezing rain or drizzle in the 10-year period from 1939 to 1948. Based on data from 95 Weather Bureau stations.



Source: Wind Energy: Cold Weather Issues (adapted from Bennett, 1959).

Q20. BNE assumes a 10% deduction after losses in its capacity factor projections. Is this number accurate?

A20. Wind projects often encounter generation losses due to turbine maintenance, transmission losses, inoperable wind conditions, wind turbulence, blade icing and a number of other factors. In the wind assessment, BNE acknowledges that siting the turbines so close to one another may adversely impact the project's power output. However, it fails to detail how this negative impact on power output was accounted for in their assumed "deduction of 10% typical electrical and other losses." (Exhibits M, Wind Assessment, page 3.) While a 10% generation loss may be standard for some projects, Colebrook's exposure to cold winter weather and relative proximity of the turbines to one another makes it likely that generation losses will be closer to 15-20%. This reduced capacity factor would have an enormous impact on project output and profitability. More importantly, it should raise concerns to the Connecticut Siting Council in its mission to approve renewable projects that provide Connecticut ratepayers the lowest reasonable cost power.

VII. Historical Performance of Other Northeast Wind Projects

Q21. How does Colebrook's assumed 30% capacity factor compare to other existing wind projects in New England?

A21. A review of historical capacity factors of other Northeast wind projects between 1-60 MW suggests that a 30% capacity factor would be considered high even for projects located in areas with superior wind resources. As part of the Connecticut RPS, states can purchase qualifying renewable energy from anywhere in New England. If the intent is to provide renewable energy at the lowest possible cost, there appear to be far more attractive sites than Colebrook.

In 2009, Northeast wind projects had an average capacity factor of 26.8%. This figure was calculated after generation deductions. Most of this operating wind projects are located on sites with wind resources superior to the Colebrook site.

Q22. BNE has claimed that both Colebrook South and North will operate at a 30% capacity factor. Is this number reasonable after examining the historical performance of other Northeast wind projects?

A22. No, it is not reasonable to expect Colebrook South and North will operate at a 30% capacity factor, as BNE claims in its petition. It is reasonable to forecast that given Colebrook's wind resources, wind turbulence created by turbine proximity and icing creating inoperable conditions, Colebrook South and North will operate in the 22-26% range.

Q23. Does BNE's petition make any mention of the capital, operation, maintenance or other costs necessary to build and operate a wind project?

A23. Such estimates are not provided in BNE's petition. We would expect that a small 6 turbine operation as proposed would have higher production costs since it would be unable to enjoy the economies of scale or capital and operating cost savings from a much larger wind project. Under Statute 16-50g, the Council is required "To provide the balancing of the need for adequate and reliable utility services *at the lowest reasonable cost* to consumers with the need to protect the environment . . ." (Emphasis added.) Colebrook South and North are unlikely to represent the lowest reasonable cost renewable resource. In fact, development is already underway for various renewable projects that will likely provide cheaper power than Colebrook South and North.

Figure 3. Historical Wind Generation and Capacity Utilization in the Northeast

			Wind Generation (MWh)			Capacity Factor %		
Wind Project	State	Capacity	2007	2008	2009	2007	2008	2009
Hull II	MA	1.8	7,398	3,674	5,537	46.9%	23.3%	35.1%
Beaver Ridge	ME	4.5			12,251			31.1%
Mars Hill	ME	42	99,071	131,621	121,141	26.9%	35.8%	32.9%
Stetson Wind	ME	57			138,980			27.8%
Lempster Mountain	NH	24		10,319	62,478			29.7%
Jersey Atlantic	NJ	7.5	20,411	20,885	20,920	31.1%	31.8%	31.8%
Madison Wind	NY	11.5	21,254	19,067	19,859	21.1%	18.9%	19.7%
Fenner	NY	30	72,190	70,930	64,113	27.5%	27.0%	24.4%
Munnsville	NY	34.5		88,502	89,495		29.3%	29.6%
Somerset	PA	9	20,206	20,084	18,663	25.6%	25.5%	23.7%
Green Mountain	PA	10.4	7,694	8,299	7,809	8.4%	9.1%	8.6%
Mill Run	PA	15	32,786	36,735	38,034	25.0%	28.0%	28.9%
Bear Creek	PA	24	57,911	60,403	62,040	27.5%	28.7%	29.5%
Locust Ridge	PA	26	53,978	70,070	68,807	23.7%	30.8%	30.2%
ForwardWind	PA	29.4		21,440	42,516		8.3%	16.5%
Meyersdale	PA	30	73,392	75,720	76,171	27.9%	28.8%	29.0%
Casselman	PA	34.5		80,663	93,121		26.7%	30.8%
Lookout Wind Power	PA	37.8			83,608			25.2%
Searsburg	VT	5.2	10,511	10,235	11,589	23.1%	22.5%	25.4%
					Annual Avg.	26.2%	25.0%	26.8%

VIII. Renewable Alternatives to Wind

Q24. What renewable energy sources are eligible to meet Connecticut's Class I Renewable Portfolio Standard (RPS)?

A24. Connecticut's Class I Renewable Portfolio Standard (RPS) increases from 8% of total retail sales in 2011 to 11% by 2014, and then increases 1.5% annually to reach 20% by 2020. Connecticut utilities must submit Renewable Energy Credits (RECs) to cover their required portion of required Class I renewable energy. Eligible Class I renewables include solar, wind, geothermal, Landfill Gas (LFG), ocean and tidal power, sustainable (closed-loop) biomass facilities, and certain newer run-of-river hydroelectric facilities not exceeding 5 MW. Connecticut has limited solar, geothermal, ocean and tidal resources, while its wind resources are marginal. However, renewable energy from ten Northeast states[4] can be imported to meet Connecticut's Class I RPS. As a result, much of Connecticut's Class I renewables have been generated from out-of-state resources. In 2007, Maine supplied 54.8% of Connecticut's Class I RECs[5], while New Hampshire supplied 19.3%. Connecticut supplied only 2.5% of the Class I RECs. Maine has a disproportionately large share of New England's renewable power projects because developers have constructed renewable projects in areas with cost-effective resources (i.e. wind and hydro projects in Maine). Connecticut has few cost-effective renewable resources, and has seen little development of wind projects to date.

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[4] Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont,

[5] Source: Connecticut's 2007 RPS Compliance Report: http://www.dpuc.state.ct.us/electric.nsf/$FormRenewableEnergyView?OpenForm

Q25. If Connecticut lacks the adequate wind resources to warrant cost-effective development, what other options exist in Connecticut's efforts to meet its renewable generation requirements?

A25. New England is blessed with modest biomass (wood) resources, and a number of biomass wood plants are in various stages of advanced development in Connecticut and elsewhere across New England. NRG is re-powering Unit #5 at its Montville coal plant to use 300-400,000 tons of forest residues, tree trimmings and clean, recycled wood each year as its main fuel source. The 40 MW plant is scheduled to be completed in July 2011.

In July 2010, the Connecticut Clean Energy Fund awarded Plainfield Renewable Energy LLC $500,000 to proceed with development of its 37.5 MW plant.

Q26. If completed, how much renewable power would these biomass projects produce compared to Colebrook Wind?

A26. If completed, Montville #5 and Plainville would generate approximately 511,000 MWh of renewable energy annually[6]. This represents more than 60 times the renewable power that Colebrook Wind would produce, according to the BNE's petition. Biomass power plants generally operate as baseload units, and produce a relatively consistent supply of electricity vs. wind. As a result, renewable power produced from biomass plants is generally substantially cheaper than wind power.

Overall, 593.1 MW of biomass wood power plants are in various stages of development across the Northeast[7]. If only half of this biomass capacity is constructed, it would produce 1,948,000 MWh[8] of renewable power, or approximately 6.6% of Connecticut's total retail sales in 2009.

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[6] Assumes a 75% capacity factor for both projects
[7] Source: SNL Financial
[8] Assumes 75% capacity factor

Figure 4. Northeast Biomass Wood Power Projects under various stages of Development

Power Plant	Owner	State	Operating Status	Projected Generating Capacity MW
Ogdensburg Repower	Alliance Energy Group	NY	Under Construction	25
Berlin Wood Burning	Laidlaw Energy Group Inc.	NH	Planned	70
Russell Biomass	Westfield Paper Lands	MA	Planned	50
Pioneer Renewable Energy	Madera Energy Inc	MA	Planned	47
Montville 5 Repowering	NRG Energy Inc.	CT	Planned	40
Onondaga Renewables	Multiple	NY	Planned	40
Plainfield	Multiple	CT	Planned	37.5
Palmer Renewable Energy	Caletta Renewable Energy	MA	Planned	36.5
Mount Hope Biomass Power Plant	Mount Hope Hydro Inc.	NJ	Planned	30
Fair Haven Biomass Project	Beaver Wood Energy	VT	Planned	29
Pownal Biomass Project	Beaver Wood Energy	VT	Planned	29
Hopkinton Biomass	Diagnostic Inc	NH	Planned	28
Clean Power Berlin Cogen Plant	Clean Power Berlin	NH	Planned	26.1
Madison Biomass Wood Facility	Madison Paper Industries Inc	ME	Planned	25
Henniker Biomass Facility	Laidlaw Energy Group Inc.	NH	Planned	20
Concord Industrial Park Project	Concord Steam Corp	NH	Planned	17
Dunkirk Biomass Project	NRG Northeast Generating LLC	NY	Planned	15
IntelliWatt Renewable Biomass Wood Project	IntelliWatt Renewable Energy	PA	Planned	13
Newton Falls Fine Paper	Newton Falls Fine	NY	Planned	10
Lakes Region Pellets	Sanco Energy LLC	NH	Planned	5
			Total	593.1

Q27. What would represent a sensible plan for development that would enable Connecticut to achieve its 20% Class I RPS requirements by 2020?

A27. Connecticut has enacted incredibly aggressive renewable generation requirements relative to the state's actual renewable resource potential. In 2009, Connecticut retail power prices averaged 18.21c/KWh, the second highest rate nationally (behind only Hawaii) and 84% higher than the nationwide average of 9.89c/KWh. These high prices are largely a result of the state's heavy reliance on nuclear and natural gas, and minimal usage of low-cost coal generation.

Deriving 20% of all electricity sales from higher-cost renewables by 2020 will likely push power costs even higher for Connecticut consumers. Therefore, it is crucial that sensible, cost-effective renewable power projects are developed to protect the ratepayer from further increases in power prices. Development of the Montville and Plainfield biomass plants, coupled with the construction of wind projects in areas with superior wind resources vs. Colebrook wind (along the Southern Coast by New London, or offshore) would represent a sensible step in meeting Connecticut's Class I RPS requirements. The remainder of the renewable generation requirements could be imported from elsewhere in New England (wind in Maine, biomass from New Hampshire, etc).

IX. Transportation of Wind Turbines

Q28. Do Colebrook North and South's site plans adequately detail how the turbine components will be safely transported to site and erected?

A28. Colebrook North and South's site plans fail to detail what kind of equipment (railroad, trucks, crane) will be used to transport the turbine components (tower, nacelle, blades) to the site. The size and weight of turbine components often necessitates special transportation and site planning. BNE's proposed turbine model, GE's 1.6 MW 82.5, has blades lengths of 41.5 meters (136 feet) and a tower height of 100 meters (328 feet). Turbine towers may weigh as much as 1 ton per foot, while the turbine nacelle could weigh as much as 60 tons, and turbine blades 8-10 tons. BNE will have to employ special equipment to accommodate the size and weight of the turbine components. More information on these issues is included in the testimony of John Stamberg on behalf of the Town of Colebrook.

Q29. Has BNE detailed what equipment it plan to use to transport the turbine components?

A29. No, it has not.

Q30. What specific areas of Colebrook North's site plan appear problematic to transport and erect the turbines?

A30. The 90-degree right turn from Route 44 to Rock Hall Road will prove difficult for a conventional tractor trailer. To accommodate turbine length, the tractor trailer carrying the turbine blades will need to be over 150 feet long. It is likely the turning area will need to be widened substantially to accommodate the tractor trailer's turning radius. Expanding the turning area at the mouth of Rock Hall Road may force BNE to expand beyond its property lines. It is unclear if BNE has accounted for this in its site plans, as no turbine transportation or site plan has been provided. Additionally, there does not appear to be sufficient space for the tractor trailer to back out and turn around at any point along the turbine access road. The tractor trailer will likely be forced to move in reverse, which could prove dangerous give the size and weight of the trailer's cargo.

Q31. What specific areas of Colebrook South's site plan appear problematic to transport and erect the turbines?

A31. As with Colebrook North, the 90-degree turn from Flagg Hill Road to the turbine access road will prove extremely difficult for a conventional tractor trailer carrying turbine components. It is likely the road will have to be widened, or that a new road will be created to be accommodate the tractor trailer load. Since BNE has not submitted any turbine transportation plans, it is impossible to ascertain how BNE is planning to transport the turbines to site and erect them there.

Q32. A review of the BNE's site plan reveals that both Colebrook North and South's crane access areas and crane pads are comprised of a gravel surface. The tower section laydown area's surface is comprised of compacted earth. Are these surfaces sufficient to handle the weight of the crane awkwardly lifting the tower, nacelle and blades?

A32. The crane area must have a solid, compact surface that is suitable to serve as a stable, secure base. Generally, cranes sit on asphalt or concrete foundations. Compact earth and gravel may not be sufficient, because when combined with rain, snow or other moisture, they may possess too much "give." Since BNE has not submitted plans for turbine transportation and construction, I am unable to independently verify that the gravel and compacted earth surfaces are adequate to handle the size and weight of the crane and its turbine components.

X. Conclusions

Q33. What are your overall conclusions regarding these proposed projects?

A33. BNE has provided little detail on any number of its assumptions which are crucial to evaluating the competitiveness of the proposed project, including the rationale behind the 30% capacity factor and the 10% generation deduction. BNE has also failed to detail potential construction, operation and maintenance costs of the two turbines. BNE has not detailed how Colebrook's mediocre wind resources, the turbine's close proximity to one another and the impact of icing should reduce turbine efficiency and output, leading to a generation deduction closer to 20% than BNE's assumed 10%. This larger deduction loss would likely put the capacity factor closer to 22-26% than BNE's assumed 30%.

Assuming these deductions, the turbines would operate relatively inefficiently vs. areas with superior wind resources. This would result in higher power production costs, and the developers would likely need to charge a higher price for their power to cover their costs and make a profit. Colebrook residents will likely be uncomfortable paying higher power prices for an inefficient wind project when other renewable options are available.

The statements above are true and accurate to the best of my knowledge.

March 15, 2011	/s/ David Pressman
Date	David Pressman

ATTACHMENTS

Exhibit 1	CV of David Pressman
Exhibit 2	Wind Power Production Costs at Different Capacity Factors
Exhibit 3	Connecticut Wind Resources at 80m
Exhibit 4	Commercial on-shore and off-shore wind speeds at 50m
Exhibit 5	Maine Avg. Annual Wind Speeds at 80m
Exhibit 6	Colebrook South's proposed turbine locations compared to one another

EXHIBIT 1

DAVID PRESSMAN

1527 Independence Ave SE Unit A • Washington, DC 20003 • David.H.Pressman@gmail.com • 617-962-0058

QUALIFICATIONS

- Professional experience in issues related to state and federal energy policy, renewable power development, global energy resource supply and demand, emissions trading markets, carbon offsets
- Experience modeling the impact of regulatory action and market conditions on energy supply and demand and their impact on future coal, natural gas, and renewable energy prices
- Experience using Word, Excel, PowerPoint, Lexis-Nexis, Thomas, Internet Quorum, SPSS and Internet

ENERGY CONSULTING EXPERIENCE

ENERGY VENTURES ANALYSIS — ARLINGTON, VA

Technical and Economic Analyst of Energy Markets and Policy — **January 2009-present**

- **Renewable Power**
  - Developed and managed computer model that forecasts renewable energy development and generation growth for wind, solar, biomass, geothermal and other renewable power projects on a regional and state level
  - Projected regional renewable power demand growth by aggregating growth of the 30 states with Renewable Portfolio Standards (RPS)
  - Forecasted technology improvements and evaluated changing capital costs and financing structures for wind (on-shore and offshore), biomass (wood and waste), solar, geothermal and other renewables
  - Analyzed impact of growing wind generation on coal and natural gas displacement on a state-by-state level
  - Evaluated the differences between varying policies of the 30 states with renewable requirements, and the impact of these differences on macro-level renewable growth

- **Impact of State and Federal Energy and Environmental Policy on the Electric Power Sector**
  - Modeled the impact of Congressional legislation (Waxman-Markey and Boxer-Kerry), State Renewable requirements or other federal policy (1603 Treasury Cash Grant Program Production Tax) on fossil fuel demand, electricity prices, renewable technology growth and power plant economics and development
  - Modeled and evaluated impact of varying SO2 and NOx emissions limits in EPA's Clean Air Transport Rule and Carper Three Pollutant (3-P) legislation on coal unit retirements, retrofits of emissions controls (FGD, SCR, Mercury and Particulate Controls) and power plant operating costs
  - Evaluated impact of increased shale gas production on coal demand, power unit utilization and electricity prices

- **Economic Analyses of Wind Projects**
  - Conducted economic and technical analyses of developer applications and wind resource studies
  - Evaluated developer projections made toward assumed project capacity factors and project output while projecting power generation and electricity prices; evaluated site locations, project economics and financing structures for individual wind projects
  - Developed PowerPoint presentations and submitted written testimony to local and state Siting Boards
  - Developed wind computer model to assess developer assumptions toward capacity factor, power sales, Renewable Energy Credit (REC) revenues, depreciation schedules, tax liabilities

- **Carbon Offset Development, Usage of Biomass in Power Production and Ethanol Production**
  - Performed economic and engineering analysis of proposed carbon offset projects (afforestation, forest management, agricultural sequestration, coal bed methane) on land use
  - Evaluated impact of increasing corn and cellulosic ethanol production on farming and land use practices
  - Evaluated biomass supply (clear cut trees, wood pellets, forest trimmings, urban waste) and transportation options for utilities interested in using biomass as a fuel for power generation

- **Petroleum Storage and Pipeline Infrastructure**
  - Made multiple site visits and helped perform due diligence on Petroleum Storage and Pipeline Infrastructure corporation with a dozen U.S. locations on behalf of private equity client
  - Evaluated the physical condition of company's storage and pipeline assets, their transportation options and proximity to central petroleum distribution sites with those of nearby competitors
  - Developed PowerPoint presentations evaluating the current and future competitiveness of company's assets, market position and strategy
  - Analyzed the corporation's current and future position compared to both local and global competition and made assessments to clients based on global outlook for heavy oil products, ethanol and vegetable oil demand and pipeline infrastructure

PUBLICATIONS

Researched and co-authored the following:

- *Emissions Allowance, Electricity and Renewables* sections of the Short-Term and Long-Term Outlook of EVA's FUELCAST, a bi-annual global market analysis and price forecasting report.
- An analysis of renewable energy and energy efficiency programs, clean coal projects and other advanced energy initiatives underway in the 16 states of the Southern Governor's Association in a report entitled *Digest of Climate Change and Energy Initiatives in the South.* Report was published in August 2009 by the Southern States Energy Board for state legislators, industry groups and media organizations
- "Renewable Overload," *Utility Fort Nightly* magazine, August 2009
- "Calculating Wind Power's Environmental Benefits," *Power Engineering Magazine,* July 2009

INDUSTRY PRESENTATIONS

- Served as Expert Witness in front of two Massachusetts Siting boards as they heard testimony regarding Wind power development in Wareham and Bourne, MA. Developed and presented "An Overview of the Issues Surrounding Wind Development and a Look at Massachusetts' Green Communities Act" to Wareham Zoning Board of Appeals and the Cape Cod Commission as both bodies reviewed separate wind projects. November 2010.
- Presented "North American Power Plant Construction Outlook 2010-2030" to a large audience of state legislators and industry professionals at the Energy Council's *State and Provincial Trends in Energy and the Environment* Conference in Saskatoon, Saskatchewan, Canada, June 2009.

GOVERNMENT RELATIONS AND POLICY EXPERIENCE

NATIONAL CABLE COMMUNICATIONS — FRIENDSHIP HEIGHTS, MD
Production Coordinator — **July 2008-November 2008**

- Worked with local television stations to place political advertisements in local markets across the country during the 2008 Election cycle

OFFICE OF SENATOR EDWARD M. KENNEDY — WASHINGTON, DC
Policy Intern — **January 2008-May 2008**

- Researched and wrote analyses of Senate member voting patterns on issues including energy, defense, foreign affairs, immigration and tax policy for senior legislative staff.

VAN SCOYOC ASSOCIATES — WASHINGTON, DC
Research Analyst — **September - December 2007**

- Reported on Congressional committee hearings and wrote weekly analyses assessing the potential impact of government grants and contract opportunities for the corporate clients of the Capitol Hill government relations firm.
- Worked with Van Scoyoc senior staff to prepare PowerPoint marketing presentations for potential clients.

O'NEILL AND ASSOCIATES — BOSTON, MA
Research Intern — **December 2006 - January 2007**

DISTRICT OFFICE OF U.S. CONGRESSMAN EDWARD MARKEY — MEDFORD, MA
Constituent Relations Intern — **Summer 2005**

EDUCATION

UNIVERSITY OF ROCHESTER — ROCHESTER, NY
Bachelor of Arts with Honors in History and Political Science minor — **May 2007**

- **Senior Honors Thesis:** Examined the "German Problem" of social and political extremism within German history and its impact on 19th and 20th century global politics
- Phi Alpha Theta, National History Honors Society
- **History GPA:** 3.6/4.0.
- Semester abroad at the Università di Siena in Arezzo, Italy, Spring 2006

EXHIBIT 2

Wind Power Production Costs at Different Capacity Factors

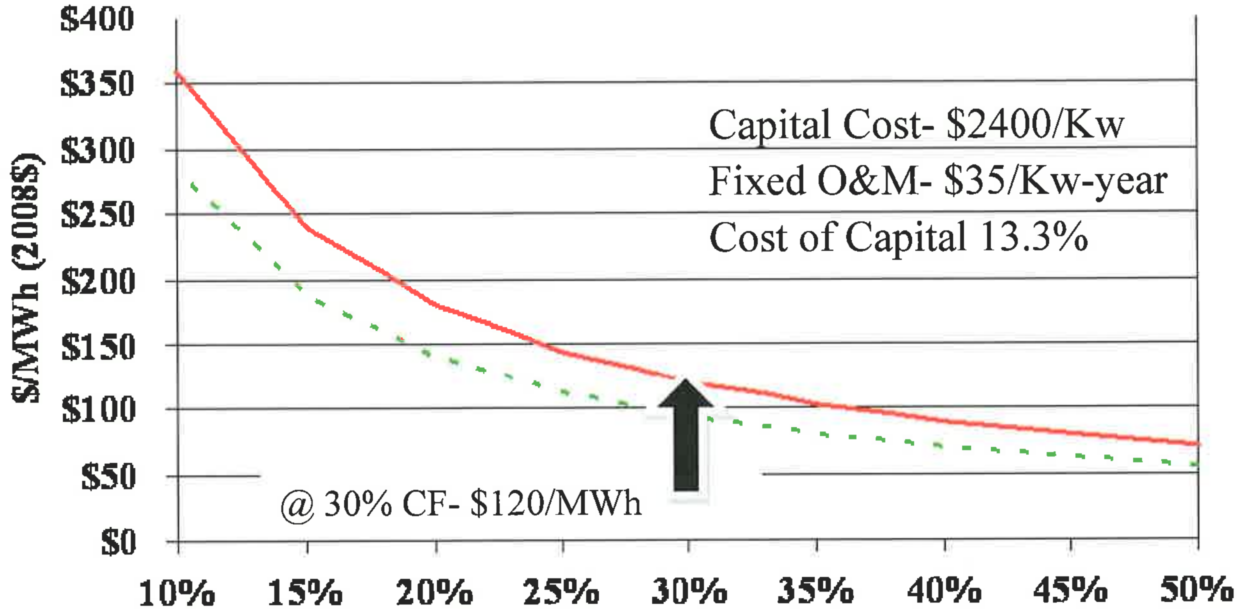


EXHIBIT 3

Connecticut Wind Resources at 80m

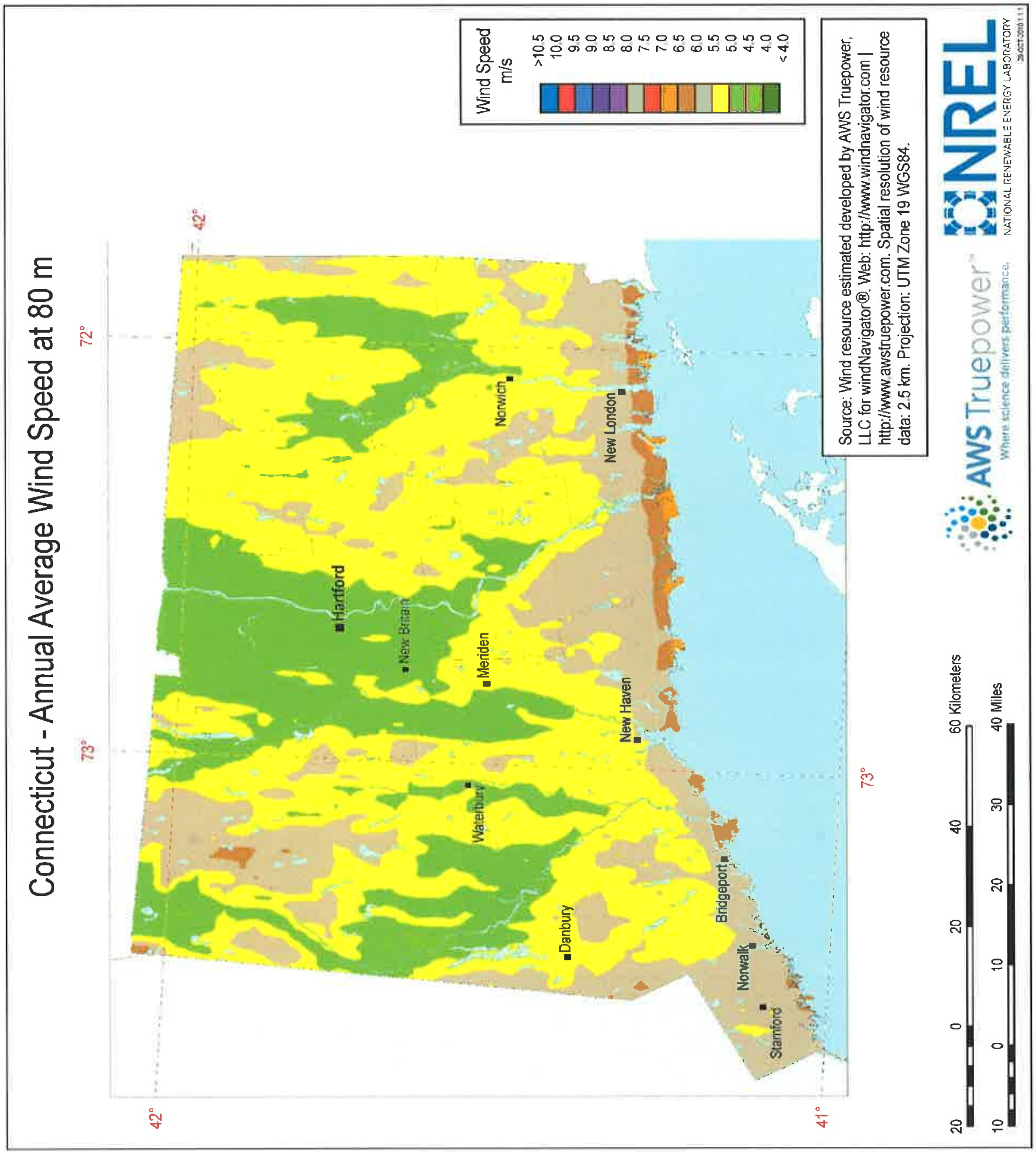


EXHIBIT 4

Commercial on-shore and off-shore wind speeds at 50m

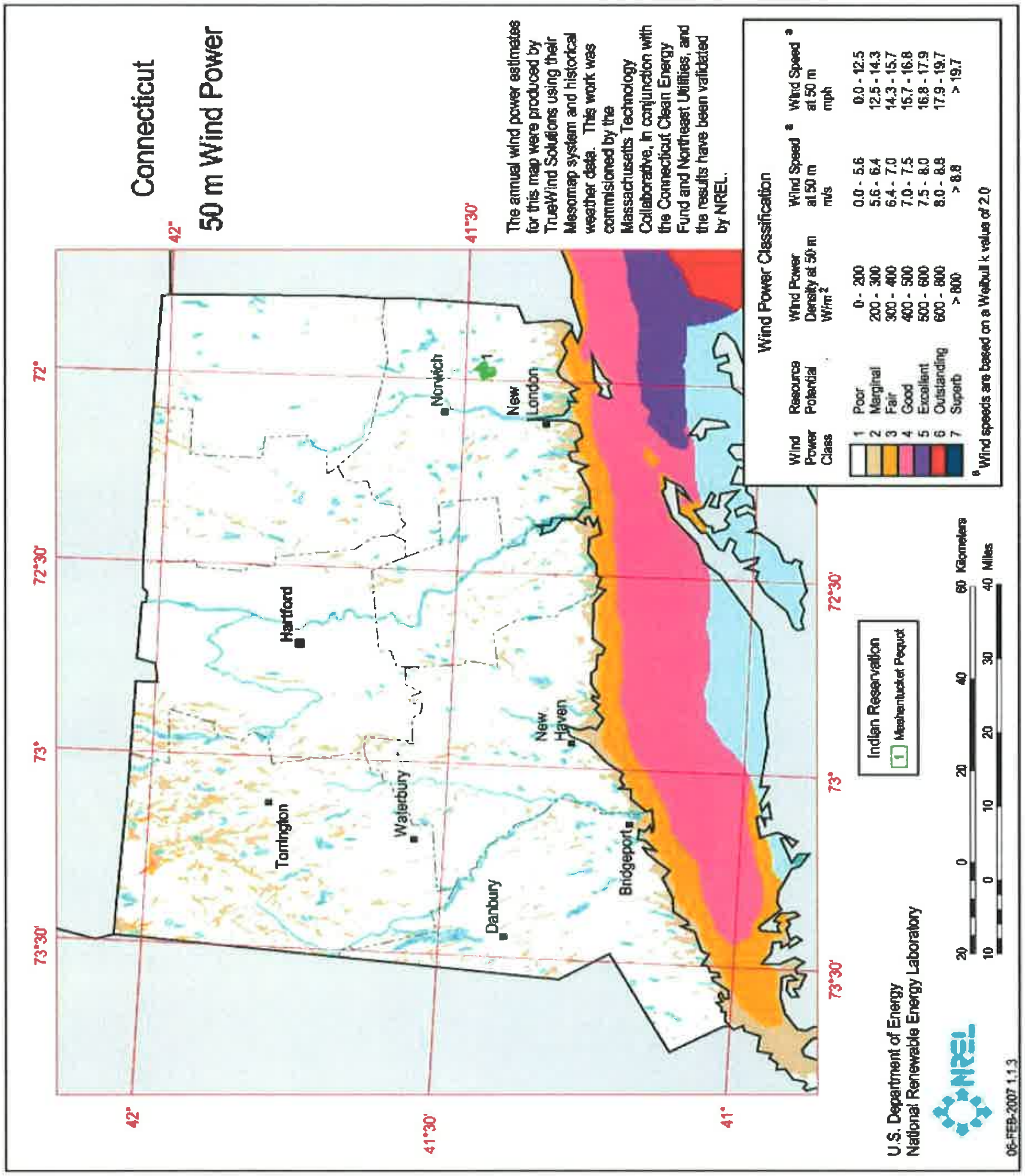


EXHIBIT 5

Maine Avg. Annual Wind Speeds at 80m

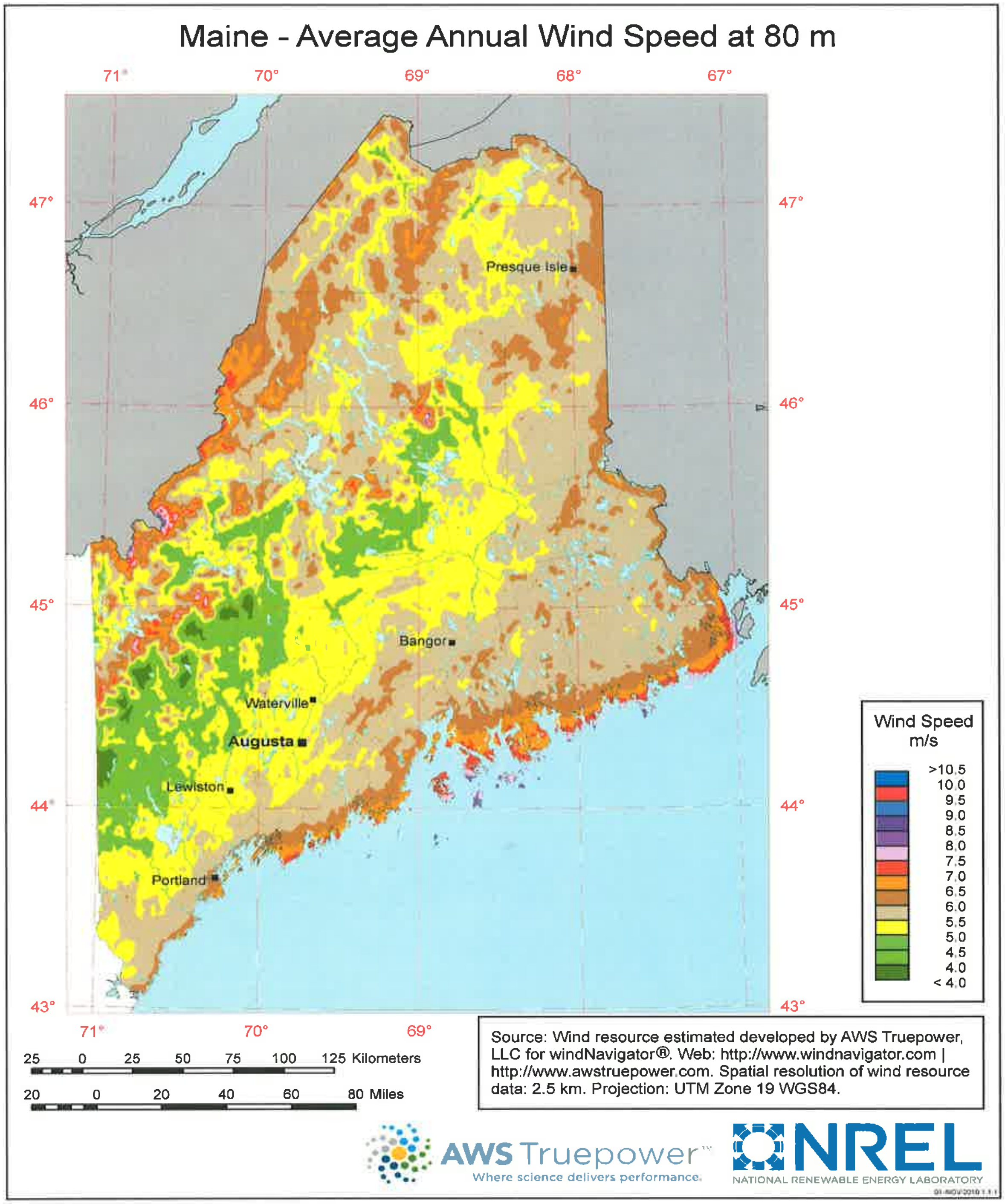
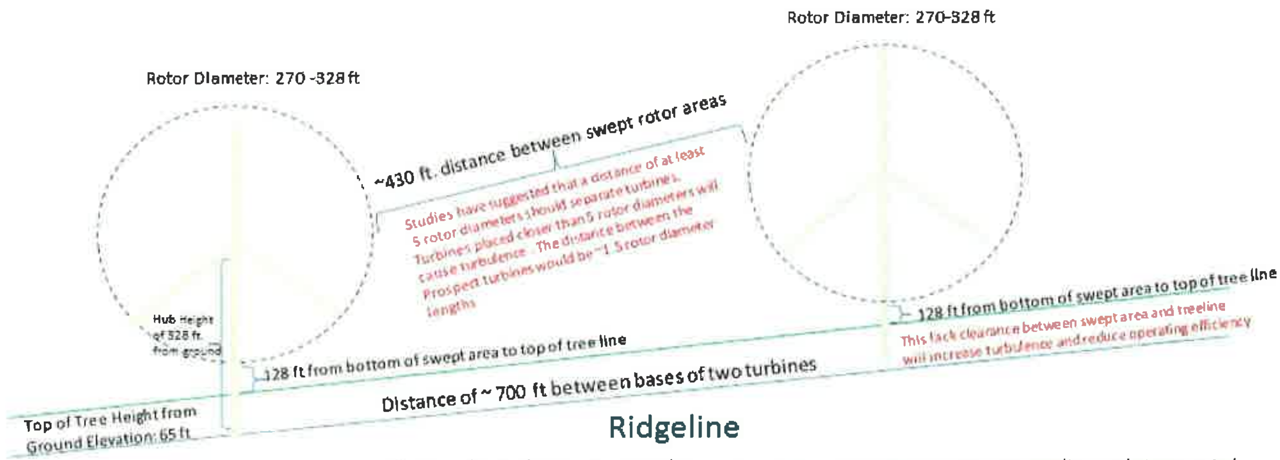


EXHIBIT 6

Colebrook South's proposed turbine locations compared to one another



- According to the American Wind Energy Association, 60 acres per MW is a proper distance between wind turbines. This would equal approximately 96 acres for GE's 1.6 MW turbine, the model proposed for the Colebrook South site. However, Colebrook South's three turbines are located on only 79.4 square acres.
- A German study proposed that wind turbines should not be closer than 5 rotor diameters distance from one another. Colebrook South's turbines would be approximately 1.5 rotor diameters away from each other
- Little distance between the two turbines and only 128 feet from the bottom of the swept area to the tree top would result in high levels of wind turbulence.
- High levels of turbulence between Prospect 1&2 would result in lower power output and higher maintenance costs. The combination of these two would adversely impact turbine operation and project profitability.

Sea Level

CERTIFICATION

I hereby certify that a copy of the foregoing document was delivered by first-class mail and e-mail to the following service list on the 15th day of March, 2011:

Carrie L. Larson
Paul Corey
Jeffery and Mary Stauffer
Thomas D. McKeon
David M. Cusick
Richard T. Roznoy
David R. Lawrence and Jeannie Lemelin
Walter Zima and Brandy L. Grant
Eva Villanova

and sent via e-mail only to:

John R. Morissette
Christopher R. Bernard
Joaquina Borges King

Emily Gianquinto