An Analysis of Industrial Wind Farms Proposed for Colebrook, Connecticut

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Utility-scale wind projects are best sited in high-wind, rural locations like North Dakota or West Texas. Wind development in densely populated, suburban locales with marginal wind resources such as Colebrook does not make practical or economic sense.

- The American Wind Energy Association believes 75 acres per turbine should be required for larger new turbine designs. In BNE Energy's petition to the Connecticut Siting Council, they plan to construct three, 492-ft-tall turbines in both Colebrook North and South, which are only 79.4 and 124.9 acres. Siting three turbines each in such a confined area will increase wind turbulence, reducing each turbine's individual power output and hurting overall project productivity.

- In page 7 of BNE's Colebrook wind assessment, BNE notes that there is a distance of two rotor diameters between turbines in each row. They go 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*." (italics added). Despite this admission, BNE has failed to quantify the impact of wind turbulence on project output in their power output projections.

- BNE claims that the Colebrook site is "ideally suited for a wind generation project due to its elevation, orientation and topographical characteristics." BNE claims that both sites will average 7.1 m/s at 100 meters. However, no wind projects have been erected in Connecticut, largely because the state has very mediocre wind resources.

- The Department of Energy (DOE) considers Class IV wind resources (>7m/s) the minimum to warrant development. DOE classifies Connecticut's wind resources as Class II-III, or "poor" or "marginal."

- In 2009, wind projects of the Northeast had an average capacity factor of 26.8%. The majority of these projects were sited on locations with wind resources superior to Colebrook, yet BNE claims that the Colebrook project will achieve a 30% capacity factor. BNE has not released their wind speed data for independent review. Based on the Colebrook site's location and historical performance of other wind projects in the

Northeast, our analysis indicates that the BNE project will operate at a 22 to 26% capacity factor. There is little evidence to support BNE's claim that both Colebrook projects will achieve a 30% capacity factor.

- BNE has failed to account for what impact turbine blade icing will have wind project performance in Colebrook's Northeast location. One report from the University of Massachusetts in Amherst 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 March." Given that the wind blows more consistently in the winter months, icing will further reduce the efficiency of the turbines. BNE has failed to account for this amount of icing in their power projections.

- Wind projects operate intermittently, and are not "dispatchable" in the same manner that coal, natural gas or even hydro power is. When the wind does not blow, Connecticut Light and Power will have to operate a natural gas turbine to compensate for the lack of wind output.

- Consequently, wind only receives a 19% capacity credit in New England.[1] That is, for every 100 MW of wind capacity installed, only 19 MW is counted toward meeting grid reserve margin requirements. Coal, gas, even biomass power units, which grid operators are able to dispatch on command, have a 100% capacity credit. Instead of wind capacity construction enabling utilities to retire old coal and oil units, as many wind developers claim, the effect is that developers would have to install five times the amount of wind capacity as any other reliable resource to meet grid stability and reserve margin requirements.

- Connecticut must derive 20% of its total electrical generation from renewables by 2020. To achieve this, the Connecticut Clean Energy Fund has awarded BNE $500,000 each for Prospect and Colebrook. However, wind is one of many qualifying renewable resources that are eligible to meet CT's Class I Renewable Portfolio Standard. Eligible Class I renewables include solar, wind, geothermal, landfill gas, ocean and tidal power, sustainable biomass and small hydro.

- Two biomass power plants are currently in advanced stages of development. .(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.)

- If completed, Montville #5 and Plainville would generate approximately 511,000 MWh of renewable energy annually. This represents more than 20 times the renewable power that both Colebrook sites 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.

- 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. In 2006, the average Connecticut household consumed 9.1 MWh[2], approximately 20% less than the national average of 10.96 MWh annually.

- 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.

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[1] http://www.iso-ne.com/committees/comm_wkgrps/othr/sas/mtrls/may212007/final_sa_modeling_assumptions.pdf

[2] Source: Department of Energy 860 Data for 2006