PETITION NO. 983 - 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.	}	Connecticut
	}	Siting
	}	Council
		June 2, 2011

Opinion

On December 6, 2010, BNE Energy, Inc (BNE) submitted a petition to the Connecticut Siting Council (Council) 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 megawatt Wind Renewable Generating facility located on Flagg Hill Road in Colebrook, Connecticut. Pursuant to CGS §16-50k(a), the project is eligible to be approved by a declaratory ruling as a grid-side distributed resource facility under 65 megawatts that is in compliance with air and water quality standards of the Connecticut Department of Environmental Protection (DEP).

Pursuant to CGS § 16a-35k, the State of Connecticut set forth an energy policy to diversify the fuel mix and to develop and utilize renewable energy resources, such as solar and wind energy, to the maximum extent possible. To accomplish this goal, the State has implemented renewable portfolio standards that require 20 percent of electric generation within the State be produced from Class I renewable energy sources, including wind, by 2020.

The proposed facility would be located on a 79.4-acre site, comprised of two adjoining properties at 17 and 29 Flagg Hill Road, owned by BNE. The site, zoned residential, is located west of Flagg Hill Road and its western boundary is along the Colebrook / Norfolk town line. A residence is located on the roughly four-acre 17 Flagg Hill Road parcel. Surrounding land use consists of a Nature Conservancy parcel to the west, a sportsmen's club to the north, a mix of state forest, undeveloped woodland, and residences to the east and undeveloped woodlands and a residence to the south. Seventy-five occupied buildings of all types are located within 1.25 miles of the site and 19 residences are located within 2,000 feet.

The site is generally rectangular in shape and consists of a relatively steep hillside and an open knoll in the eastern half, with gently sloping wooded terrain in the western half. A majority of the property is forested, excepting a 3.5-acre meadow on top of the knoll. Of three separate wetland areas, the largest wetland, Wetland 1, is a dominant feature on the site: it extends from north to south in the western half of the property and contains a 6.9-acre beaver pond. Elevations on the property range from 1290 feet above mean sea level (amsl) along Flagg Hill Road to a height of 1500 feet amsl at the top of the knoll.

BNE proposes to construct three General Electric 1.6 megawatt wind turbines at the site. Each turbine would include a 100-meter (328-foot) tall tower with a nacelle at the top. The nacelle contains the generator, other operational equipment, and the hub. Three 132-foot (40.3 meter) long blades connect to the hub, having a nominal rotor diameter of 82.5 meters (270 feet). BNE is also requesting approval to use a 100m rotor diameter at the site. The total height of the turbine, measured as the height of the tower (hub height) plus the length of a blade at its apex, is 463 feet above ground level (agl) with the 82.5m rotor diameter, or 492 feet agl with a 100m rotor diameter.

The three turbines would be located on the property as follows: the Southern Turbine would be located on the south slope of the knoll and near the beaver pond; the Northeastern Turbine would be located on the northeast slope of the knoll; and the Northwestern Turbine would be located on a slight ridge in the northwest corner of the site. The site would be accessed by a new, 35-foot wide road extending uphill from the 17 Flagg Hill Road parcel to the southeast side of the knoll. From there the road forks with one extension serving the Southern Turbine and the other extension serving the other two turbines. The road would cross a narrow section of Wetland 1 to reach the Northwest Turbine. Other proposed project facilities are an electrical collector yard to be built near the Northeast Turbine and a 40-foot by 50-foot maintenance/storage building to be built where the access road forks.

Based on the wind data and turbine model selected, the three turbines are estimated to produce 12,614 megawatt hours of electricity per year (using 82.5m rotor diameter). The project is expected to have an annual capacity factor of 30 percent using the 82.5m rotor diameter and 35 percent using a 100m rotor diameter. The electricity from the project would be a Class I renewable resource, consistent with the State's policy of developing and utilizing renewable energy resources to the maximum extent possible, as set forth in CGS §16a-35k.

The Council is charged with implementing State policies, and therefore would like to preface its opinion with two statements. First, while renewable energy sources are seemingly cost-free, they are not available anywhere and everywhere. Sites for conventional power plants are limited only by convenient access to a roadway, river, or pipeline, none of which is particularly difficult to find in Connecticut, but the number of sites for some types of renewable energy facilities is severely constrained by topography and weather. Second, some types of renewable energy projects take up more space than conventional power plants—and in different dimensions. Attempts to harvest power from renewable energy sources available across the natural landscape entail designing generation facilities at a correspondingly broad scale. Thus, the Council had to analyze environmental and social effects unique to wind energy generating facilities.

The Council has evaluated the project proposed by BNE in terms of its effects on the natural environment, public health and safety, and scenic, recreational, and cultural values related to quality of life. We begin with findings regarding the natural environment.

Air, Water, Site Disturbance/ Restoration, Wetlands

The operation of the project would not produce any air emissions or greenhouse gases and therefore would comply with DEP air quality standards.

The Council understands that designing the access road to the turbines on this site poses challenges regarding water quality because of the relatively steep slopes at certain points within the property, and the unavoidability of direct impacts to Wetland 1. However, the Council believes these design challenges can be met, so that the project would not have an adverse impact on water quality.

By ordering a Development and Management (D&M) phase for the project, the Council will assure that the project would be designed to meet DEP water quality standards, in conformance with the 2004 Connecticut Stormwater Quality Manual, 2000 DOT Drainage Manual and the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control. This D&M phase will allow opportunities for all parties to submit comments to the Council.

Overall, development of the 79-acre site would result in the temporary impacts of construction on approximately 14-15 acres of land. Of these, approximately five to six acres—only about eight percent of the site—would be permanently disturbed. Temporarily disturbed areas would include space for

construction of the proposed turbines, blade assembly and laydown areas, temporary stockpile areas, crane assembly areas, tower section laydown areas, and crane pads. More precise figures on the amount of disturbance to accommodate construction, as well as associated temporary and permanent drainage features, would be specified during final site design in the D&M phase. The five to six acres of permanent development would consist of the access road, parking areas, turbines, storage building, and crane pads. The road and parking areas would consist of compacted stone, and would be permeable. Post-construction, most of the site's temporarily disturbed portions—about nine acres—would be restored to a natural condition by the planting of a native herbaceous seed mixture to create upland meadow areas. A detailed plan for such restoration shall be specified during the D&M phase. Also, the Council will require BNE to monitor all restored areas for invasive species over a three-year period, and remove invasives where necessary, as recommended by the DEP. The specifics regarding such monitoring and removal shall be part of the restoration plan.

The access road to the Northwestern Turbine would require filling approximately 4,700 square feet of a forested portion of Wetland 1. An additional 213 square feet of this wetland would be temporarily disturbed through tree-clearing activities. To minimize disturbance to the wetland, the road crossing would occur in an area of historic disturbance associated with a former logging road. During the D&M phase, the Council will direct special attention to finding a structure for the wetland crossing that will best retain the natural stream substrate, per the DEP recommendation.

Finally, based on the significant number of environmentally sensitive areas on the subject property, such as relatively steep slopes, wetlands, and associated vernal pools, the Council will hold BNE to its commitment not to develop the site beyond its current proposal. We will require BNE to submit, during the D&M phase, a proposal for conserving portions of or all of the property for the life of the project and/or in perpetuity.

Wildlife

The Council recognizes that the subject property offers sufficient diversity and extent of habitat to attract a rich community of wildlife. Accordingly, we find wildlife protection to be particularly important.

The site as a whole is in an area with records of the Jefferson salamander and smooth green snake; both State species of special concern. Wetland 1 supports a number of amphibian species and could also support several snake species that use wetland edges as foraging grounds. In particular, it could support the spring salamander, a state-listed threatened species, and the eastern ribbon snake, a State special concern species. Development of the site would not adversely affect the habitat for any of these species, particularly considering that the access road crossing of Wetland 1, described earlier, has been designed to have its surface one foot above the existing wetland surface grade to allow for non-restricted movement of wildlife. Indeed, the site presents an opportunity to increase prime habitat for the two snake species by creating meadow areas that are favored by them. Accordingly, the Council will order that BNE not allow the area surrounding the meteorological tower to be reforested: it shall be mowed annually to maintain its habitat value for the smooth green snake in accordance with the Herpetological Assessment conducted by Dr. Michael Klemens, dated April 20, 2011. The Council will also order that BNE carry out certain several specific measures recommended by Dr. Klemens for protecting cryptic vernal pools within Wetland 1, all identified as best management practices in Calhoun and Klemens (2002).

The Council will require periodic inspection of the site during construction by an independent environmental inspector approved by the Council to ensure that appropriate environmental safeguards protective of the wetlands and of amphibian and reptile species are being adhered to.

Although operation of the turbines could result in the mortality of none to 67 birds per year, the Council notes that BNE is currently performing additional bird studies that will complete two years of breeding bird surveys. Despite the limitations of the original interim study, the Council is persuaded that the project would not adversely affect birds at the population level. Estimated fatalities are orders of magnitude below the average number of birds killed yearly by cars or collisions with buildings. Nonetheless, recognizing the limitations of data obtained so far about the number of avian species at the site, including questions about how species use the site, the Council notes that BNE is conducting ongoing bird studies that will be concluded in the Fall of 2011. Although population-wide effects on birds from the project are not expected to be high, the Council will require three years of third-party monitoring post-construction, with results supplied to the Council and the DEP for analysis, and with the potential for mitigation measures to be implemented if significant bird mortality is found.

The Council is especially concerned, however, about the project's potential impacts to bats. Three types of bats listed as state special concern species occur on the property, and these are tree-roosting species known to be most at risk from wind turbines. Furthermore, the project is not far from several hibernacula, or locations where cave-roosting bats spend the winter. This proximity increases the potential numbers of bats that could be foraging around the wind turbines during some periods. Experts agree that forested wetlands with standing water tend to attract foraging bats: this raises the possibility that the Southern Turbine, which is close to the beaver pond in Wetland 1, may create a risk of bat mortality. Because the mortality of bats is projected to be low to moderate (up to 190 deaths per year), the Council concurs with the DEP in requiring post-construction monitoring. Specifically, the Council confirms the importance of a current study on bat migration at the site (May-November 2011), and will require three years of third-party post-construction monitoring, as recommended in draft guidelines issued by the U.S. Fish and Wildlife Service, with results supplied to the Council and the DEP for analysis, and with the potential for mitigation measures to be implemented if high bat mortality is found.

Overall, on issues of wildlife, the Council's opinion is that inspection and monitoring ordered by the Council will be sufficient to manage impacts. Furthermore, if necessary, varying types of and approaches to mitigation could be undertaken.

Public Health and Safety

Concerning the project's effects on public health and safety and on scenic, recreational and cultural resources, the Council puts considerable weight on impacts to the project's closest neighbors. Connecticut is a small, densely-populated state—the fourth most densely-populated state in the country. Yet the Town of Colebrook, with only 48 people per square mile, is over 10 times less densely populated than Connecticut as a whole, and neighbors to the proposed project are relatively few and far between. The more rural an area is, the smaller the number of people that would be adversely affected by development of any kind, including wind turbines. Notwithstanding the low population density, the Council must consider the following matters regarding public health and safety: ice throw/drop, shadow flicker and noise.

Ice Drop/Throw

The risk of ice drop and ice throw from the turbines was analyzed carefully, and the Council believes it is not a concern, providing that the proposed mitigation measures, stated below, are employed. Ice dropping from a stationary turbine would land within 131 feet of the turbine 90 percent of the time. Additionally, the likelihood is remote that a significant mass of ice dropped from a blade would land farther away than 394 feet: this would only occur if the wind were blowing harder than 55 mph. Although three neighboring properties are within range of exceptional ice drop, up to 394 feet with 100m rotor diameter, the portions of the affected parcels are heavily forested (one property is a conservation parcel to the west, another is a sportsmen's club to the north, and the third is a large parcel containing a single-family

dwelling to the south). As for ice throw, the likelihood of ice being thrown beyond the site boundaries is also remote. If no mitigation measures were employed, ice could potentially be thrown up to 935 feet, but not within the range of any non-project residence. Ice throw beyond site boundaries could be avoided altogether by automatic or manual shut-down of the turbines during icing conditions, and by special attention to blade de-icing by personnel who would come on-site to re-start the turbine after shutdown. Accordingly, the Council will order that BNE submit a detailed Ice Safety Management Plan during the D&M phase. The plan shall specify procedures for shut-down and start-up under icing conditions, stipulating that start-up procedures under such conditions be performed only by on-site personnel. The plan shall also include a final recommendation, fully supported, on the potential for fitting the turbines with GE's Winter Ice Operation Mode.

Shadow Flicker

Shadow flicker is another impact of the proposed wind project that has been measured to a high degree of predictability. It would affect properties generally east of the site, usually two hours before sunset during specific calendar periods. The probable case study model indicates three non-project residences would experience 20 to 30 hours of shadow flicker per year for both the 82.5m and 100m rotor diameters. Using the 82.5m rotor diameter would reduce the effect from 29 hours to 27.5 hours per year at the most affected residence, 29A Flagg Hill Road. The Council views shadow flicker as a potential annoyance rather than a health threat. Shadow flicker can be mitigated in various ways, such as the installation of window blinds or landscaping at the affected residences. Since actual shadow flicker may differ somewhat from the model, the Council will work with property-owners and BNE to determine reasonable mitigations on a case-by-case basis.

Noise

Noise is a serious public-health concern, such that virtually all states have regulations limiting noise. The noise from wind turbines, in particular, has distinctive features. For instance, it has a large component of low-frequency sound. In addition, while certain elements of turbine noise are distinctly enveloping, or continuous, others can vary unpredictably, depending on wind speed, direction, and turbulence. Given these features, individuals have widely different sensitivities to turbine noise: thus, the health effects of wind-turbine noise are uniquely hard to predict. On balance, the Council is satisfied that noise emitted by the project would meet Connecticut DEP allowable limits at the nearest residential receptors, and that the DEP regulations are protective of the public health. Additionally, noise from the turbines is based on wind speed and would be loudest for a small percentage of the project's operation. Nonetheless, the Council acknowledges that some health professionals sometimes question the adequacy of state regulations either to measure or minimize the health impacts of wind-turbine noise. Furthermore, if mitigation were to become necessary, it could be difficult and costly for individuals. In view of these concerns, the Council will order BNE to conduct of post-construction noise monitoring to ensure compliance with DEP noise criteria.

Overall, on issues of public health and safety, the Council's opinion is that the turbines do have a beneficial health effect in ameliorating air pollution and the potential impacts resulting from the project's operation are manageable, in that varying types of and approaches to mitigation could be undertaken. In view of the difficulties involved in assessing actual impacts from shadow flicker and noise, post-construction, the Council reserves the right to determine mitigation measures on a case-by-case basis.

Visibility

Concerning values related to quality of life, the Council finds the visibility of the proposed turbines does not have a substantial adverse effect. Although most of the near-range views of the turbines (within a one-mile radius) would be from open areas on the project site, from open wetland areas to the west, and from wetland and open field areas on the sportsmen's club property to the north, year-round views of the hub and at least one blade at its apex would also be possible from 35 properties. It is important to note

that these properties comprise a mix of residential, recreation, commercial and agricultural uses, and are in a heavily wooded area. An additional 16 properties would have year-round views of portions of the blades. Seasonal views of the hub would be possible from an additional 45 residences within a mile of the site.

The turbines would be visible from the grounds of Rock Hall, a property listed on the National Register of Historic Places approximately 1.4 to 1.7 miles north of the proposed turbines. The State Historic Preservation Office determined the views would not have an adverse effect on this cultural resource.

Visibility of the project from recreational and scenic resources would include views of all three turbines from the observation tower at Haystack Mountain State Park and views from a tenth of a mile of Route 272, a state-designated scenic road. Neither of these impacts is substantially detrimental to the scenic qualities of these resources.

Having looked at evidence regarding both the 82.5m and 100m rotor diameters proposed by BNE for this site, the Council is of the opinion that the visual impact is the not significantly different.

Town of Colebrook Infrastructure

Improvements to the Town of Colebrook's infrastructure, including but not limited to roads and road intersections, may be necessary both before and after construction. The Council will ensure that the Town's concerns relating to its infrastructure are addressed prior to the commencement of construction by requiring, during the D&M phase, a detailed plan mutually agreed-upon between BNE and the Town for handling impacts to the Town's infrastructure, including a description of the impacts anticipated, a pre-construction assessment of the affected infrastructure, and a process for monitoring the condition of the infrastructure and if necessary, any remediation measures, post-construction. The Council expects this plan will come out of a Host Community agreement now in the process of being negotiated between the Town and BNE, an agreement we presume will be completed before the D&M phase. Regardless of how the plan is agreed upon, the Council will require pre- and post-construction inspection of the Town's affected infrastructure by an independent engineer, paid for by BNE and subject to Council approval, as a basis for ensuring that the Town will be made whole on any damage to its infrastructure.

Decommissioning

The record shows that the expected life of the project would be 20-30 years, after which time the turbines would be evaluated for upgrade or decommissioning. Recognizing the likelihood of significant environmental impacts associated with decommissioning, along with potential impacts to the Town's infrastructure, the Council will require a detailed decommissioning plan as part of the D&M phase.

The Council finds the proposed project would benefit the State by utilizing a renewable fuel source to generate electricity, thereby decreasing the use of older, less efficient generation without detriment to the local environment or surrounding community. Based on the record in this proceeding we find that the effects associated with the construction, operation, and maintenance of this wind renewable electric generating facility at the proposed site, including effects on the natural environment; public health and safety; scenic, historic, and recreational values are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the proposed project. Therefore, the Council will issue a favorable decision for this project, accompanied by conditions, including a detailed Development and Management Plan with elements designed to protect on-site resources and mitigate impacts off-site.