Garnet Hill Wind Farm Feasibility Study

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with:

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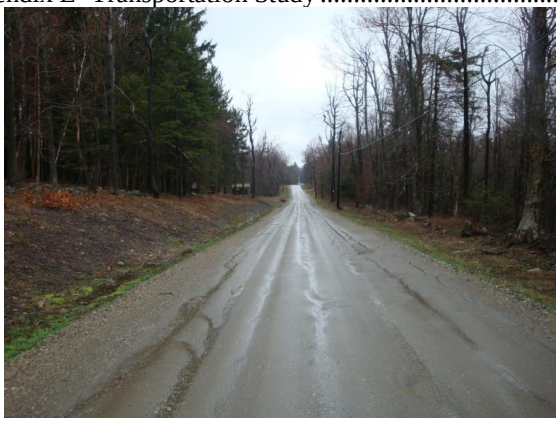

ATTACHMENTS

1 – Site Plan
2 – Electrical Interconnection Study
3 - Photosimulations
4 – Avian and Bat Assessment

0 Executive Summary

This study analyzes the feasibility of creating the Garnet Hill Wind Farm, a development of up to six utility scale wind turbines located on a ridgeline in Peru, Massachusetts. The project site is comprised of two separate properties each of which is currently secured by a Wind Feasibility Study License and Option for Wind Project Lease held by Lightship Energy, LLC. The results of this investigation determined that the wind farm can provide the area and region with a significant source of renewable energy as well as noteworthy regional economic and environmental benefits.

General conclusions of the study are as follows:

- The project is proceeding with permitting and has a superb capacity factor and significant environmental benefits.
- Recommended next steps for Lightship Energy, LLC to proceed to commercialization of the project include:
  - Finalize turbine installation size range and engage turbine manufacturers.
  - Perform a full civil engineering survey of property to confirm property line boundaries.
  - Continue consultative process with the Massachusetts Historical Commission and local Historical Commissions.
  - Design and implement public outreach program.
  - Proceed to permitting, design, engineering and construction phases.
  - Initiate WMECO interconnection process and obtain rights of ways along existing public roads and transmission corridors for transmission line.
  - Assist respective property owners as needed to modify applicable MGL Ch. 61 forest management plans to incorporate the project.
  - Secure an electricity purchase agreement or net metering credit agreement.

Significant findings regarding the project's feasibility are summarized below:

Site Layout

- The 229.8 acre site is appropriately zoned and is well suited for wind farm development.
- The site is currently and historically commercially logged, (one parcel is cleared of trees) and maintained logging roads exist. A wind farm is compatible with this current use.
- The wind farm is proposed on a ridgeline between Haskell Hill and Garnet Hill that runs roughly north-south in the Town of Peru. The ridgeline drops steeply to the west of the wind farm.
- The site has enough space for access road construction, laydown and erection to install up to six utility scale wind turbines mainly along the ridge's north-to-south axis.

Wind Resources

- A meteorological tower was installed by Boreal for the project in November, 2010. For this report, data from December 30, 2010 through December 30, 2011 are analyzed.
- Using terrain-based wind flow computer modeling, the project anticipates annual average wind speeds between 7.3 and 8.4 m/s at an 85m hub height at the chosen turbine locations. For a 100m hub height at the same locations, wind speeds range from 7.6 to 8.6 m/s.
- The project may consider the installation of remote sensing equipment to reduce uncertainty associated with assessment of vertical wind shear, inflow angle, and separated flow.

Environmental Resource Assessment

- Prior to installation of a turbine, it is recommended that Lightship Energy, LLC continue to engage relevant environmental regulatory officers and stakeholders.
- Minor intermittent streams exist along potential turbine delivery routes, but none are present at any turbine location. Possible wetland buffer impacts thus may be present. Final civil engineering and wetland impact estimation (if any) should be completed in consultation with the Peru Conservation Commission.

- The site is currently classified as forest land and subject to one or more forest management plans pursuant to MGL Ch. 61. An application will be filed to transition MGL Ch. 61 lands to allow the intended use as a wind farm.
- Some area of forested land will require clearing as part of construction and creation of access roads. The land clearing and installation of wind turbines likely will require modifications to the applicable forest management plans in coordination with the regional Service Forester.
- Essentially no shadow or flicker impacts to the community are predicted from the project.

Engineering and Interconnection Requirements

- There is no physical limit to installing up to 100 meter tower heights based on the height limit for wind turbines established by the Town of Peru Zoning By-Law. These tower heights are within Federal Aviation Administration (FAA) determination for the site.
- A single on-site transportation route was mapped and appears feasible.
- The bedrock and surficial soil geology of the Garnet Hill Wind site should allow for standard, bedrock anchored wind turbine foundations and ease of constructability of access roads and laydown areas. Additional subsurface exploration will be required to finalize the design of the foundations and surface roads.
- Electrical interconnection plans were developed for a turbine installation in the range of up to a 15 MW capacity.
- The final configuration of the wind turbine generator interconnection facilities will be determined on the basis of the system impact study process.

Regulatory/Permitting

- The Garnet Hill Wind Farm is regulated under the Town of Peru's Bylaw for Wind Energy Conversion Systems.
    - The requirement for noise from the wind farm most likely can be met under the local bylaw, especially under a smaller build-out configuration of less than six turbines. In some low probability wind direction

occurrences, one home may be impacted from noise above bylaw standard.

- Neither the U.S. Fish and Wildlife Service (USFWS) nor the Massachusetts Natural Heritage and Endangered Species Program (NHESP) identified any state- or federally-listed endangered species in the vicinity of the project site.
- To date, impacts from wind projects on avian species have been low in the United States. At 30 wind projects studied, annual mortalities/turbine ranged from 0-5 birds/year, with no mass mortalities reported (Kerlinger et al, 2010).
    - The results of the spring avian surveys suggest that the proposed project is not located in a high-use raptor migration corridor, and that the resources for resident passerine birds are unexceptional.
    - No eagles were observed at the project site, and none of the species observed are listed as threatened or endangered at the state or federal level.
    - There was a very low rate of detection for bats in the project area, as compared to data collected at other sites in New England. This suggests that the project site does not offer exceptional resources for bats, but this also may be attributable to weather conditions.
    - Because the proposed project area does not appear to offer any exceptional resources that attract avian species or bats, it is unlikely that impacts from the project will differ from existing projects in the northeastern United States, due to either direct mortality (turbine strike) or habitat loss.
- The FAA determined that there are no hazards to air navigation by any of the six proposed turbine locations with heights of up to 100m towers and 100m blades.
- No telecommunications interference issues are anticipated to occur from the project.
- All other applicable state and federal permits are expected to be obtainable for the project.

Economic Feasibility Analysis

- The sensitivity analysis showed slightly better economic results for a five turbine project versus a six turbine project.
- The sensitivity analysis also determined that a two turbine project provided better paybacks in terms of internal rate of return (IRR) and years to cashflow positive than either a five or six turbine project. The five and six turbine projects provided larger net present value returns based on their larger investment.
- It is estimated that a five wind turbine configuration would provide substantial economic benefits under current expected baseline assumptions P50 (P50 is defined that there is a 50% chance that wind farm production will be as good or better than predicted) (see **Error! Reference source not found.**), but provide uch less benefit under the much more conservative P90 conditions[1] (see **Error! Reference source not found.**).
- [REDACTED]

Table 0-1
Financial Results Two Turbine Configuration– P50, with Net Metering

Table 0-2
Financial Results Two Turbine Configuration– P50, without Net Metering

[1] 90% of the time production will be as good or better than predicted…e.g., because of lower than predicted wind speeds

2 Economic Feasibility Analysis – [Redacted]

2.1 Costs for Major Scenarios

2.1.1 Capital Costs

Table 2-1
Indicative Summary Design, Procurement, and Construction Costs (Two Turbine Project)
