Summary:

The Maine Mountain Power wind project is proposed to be constructed using 30 wind turbines (90 MW) located on both Black Nubble Mountain (18 turbines) and Redington Mountain (12 turbines). In response to comments submitted to LURC by NRCM, we have evaluated the economic feasibility of downsizing the project to 18 turbines (54 MW) on Black Nubble Mountain only. Our economic analysis illustrates that a downsized project on Black Nubble Mountain alone is not economically feasible.

The primary economic reasons why downsizing the project is not feasible include a reduction in capacity factor (output per turbine), compounded by higher capital and operating costs on a per turbine basis. These factors are described in greater detail below.

Reduction in Capacity Factor:

Average wind speed is the most important determinant of the viability of a wind energy project, because wind speed drives output and capacity factor (annual output divided by total potential output). Unfortunately, based on the wind data collected by the MMP and the estimates made by MMP's wind energy expert, the average annual wind speed at hub height for the turbines to be located on Black Nubble Mountain is forecasted to be about 10% lower than for the turbines to be located on Redington Mountain. Primary reasons for the lower wind speed observed on Black Nubble Mountain include lower elevations, as well as a less optimal layout of turbines due to the natural topography.

Due to the lower wind speed, the wind turbines located on Black Nubble Mountain are forecasted to generate (on an average per turbine basis) about 18% less energy output compared to the Redington turbines. The forecasted 2 to 1 relationship between wind speed and output is typical.

In sum, reducing project size from 90 MW to 54 MW project is a 40% reduction in capacity, expected output would actually decline by about 45%. The output per average turbine would be about 8% lower if only the Black Nubble turbines are used.

Loss of Scale Economies in Construction and Operation:

Economies of scale are also an important determinant of the viability of a wind energy project. In general, a large proportion of the capital and operating costs of a wind project are variable (cost increases/decreases with the number of installed wind turbines), and a smaller percentage of costs are fixed (cost is essentially fixed regardless of the number of installed wind turbines). Economic performance is of course enhanced to the extent that the fixed costs can be spread across more wind turbines.

For the MMP project, we estimate that about 17% of capital costs and 12% of operating costs are fixed regardless of number of turbines. Examples of fixed capital costs include the O&M facility, transmission lines, certain development costs, and crane/crew mobilization costs, whereas turbine procurement and delivery costs, turbine foundations, and most road and electrical collection system costs are variable. Examples of fixed operating costs include asset management, project administration, and substation and transmission line maintenance costs, whereas most turbine maintenance costs are variable.

Therefore, if the MMP project were to be downsized to just 18 turbines, the fixed capital costs and the fixed O&M costs would need to be spread across fewer operating turbines. As a result, the installed cost of each turbine would increase by about 11%, and the operating cost of each turbine would go up by about 7%.

In sum, reducing project size from 90 MW to 54 MW project constitutes a 40% reduction in capacity, but expected total capital cost would decline by only about 33%, and expected total operating costs would decline by only about 35%. Obviously, the higher per turbine costs degrade economics.

Reduction in Economic Return:

As described above, a Black Nubble only project would generate about 8% less output per turbine, but capital costs per turbine would increase by about 11%, and operating costs per turbine would increase by about 7%. In combination, these factors cause economic performance to be severely degraded, with capital costs about 21% higher per MWh produced, and operating costs about 17% higher per MWh produced.

The most common method of measuring the economic viability of a wind project is to calculate the after tax internal rate of return (IRR) on the capital invested in the project. We estimate that the IRR for a Black Nubble only project will be approximately 27% lower than the IRR generated by the 90 MW MMP project. This dramatic reduction in IRR would cause the return on an investment in the downsized project to fall well below wind industry norms, and to be too low to support a decision to proceed with an investment.

To put the deterioration in IRR in perspective, in order to recoup the 27% drop in IRR, the project would need to realize almost a 54% increase in its power sales price. This size of an increase in power prices is not supported by market conditions.

Other Considerations

Aside from these purely economic considerations, there are other factors which may make downsizing the project impractical or unattractive, including for example:

- The Power Purchase Agreement which has been executed between Constellation New Energy and the project company is for a project size of 90 MW, not 54 MW. Downsizing the project would require renegotiation of the PPA, which may not be achievable.

- The executed Turbine Supply Agreement which has been executed between Vestas and Edison Mission Energy (and will be assigned to the project company prior to commencement of construction) is for 30 turbines, not 18 turbines. Downsizing the project would require renegotiation of the turbine supply agreement, which may not be achievable.

- The project company has applied for interconnection approval on the basis of a 90 MW, not 54 MW, project size.

- In addition of course, a smaller project would also contribute less to reducing air pollution, does less to reduce global warming, do less to reduce dependence on

foreign oil, and serve fewer Maine electric customers with affordable renewable energy.