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Analysis of Optimum Location, Viability, and Potential Effects of Wind Farm Construction in Maine

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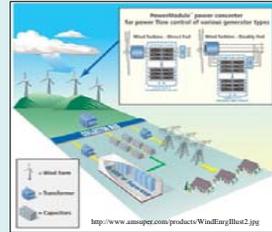
Introduction

With the continued depletion of our earth's natural resources it is becoming increasingly important to find alternate sources of energy. Our current dependence on oil and coal has led to rapid consumption of finite energy sources and has led to the increased release of greenhouse gases primarily in the form of carbon dioxide. Recent advances in wind power technology have increased the viability of constructing wind farms on the commercial and private levels. Because of the large wind energy potential in the United States, this clean and renewable source of energy could have a large impact on energy problems we are likely to be facing in the near future.

Maine has the highest potential for wind energy in New England and falls within the top twenty states in the nation. It falls just behind Wisconsin and California with an estimate electrical output of 56 billion kWhs. The geological makeup of Maine's mountains in the western part of the state, and the exposed coastline provide opportune areas to capture wind and convert it into energy. The information included in this poster will suggest the most likely areas for wind development based on a number of factors as recommended by the American Wind Energy Association.

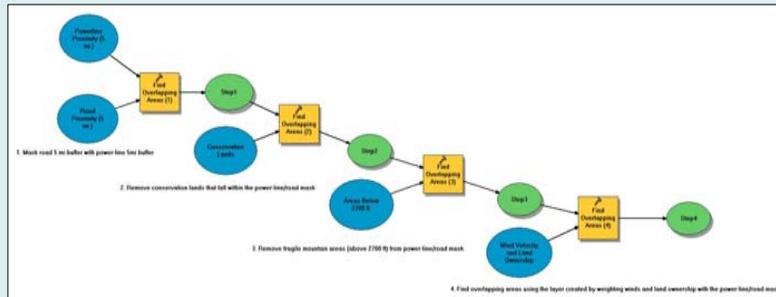


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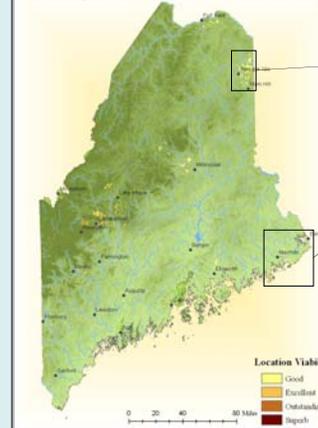
Methods



The parameters used in developing a wind energy potential model for Maine loosely follows guidelines presented by the American Wind Energy Association. There are ten steps set forth ranging from wind velocity and frequency, proximity to power lines, and access to capital and obtaining zoning permits among several others. In creating this model, six parameters were taken into consideration when evaluating land in Maine. To construct a realistic wind farm, areas had to be within 5 miles of existing power lines and roads and could not fall on conservation lands or fragile mountain areas (distinguished as lands with an elevation greater than 2700 ft.). Additionally, lands were weighted differently based upon the average wind velocity at 50 m above ground and land ownership (public, private, industrial and non-industrial). Once these parameters were decided upon they were included in a map using only the areas where parameters overlapped. After these areas had been distinguished they were rated based upon land ownership and average wind velocities to create a final model indicating the most viable areas for large scale wind farms as well as areas that are conducive to small scale construction for personal use.

Results

Viability of Private Wind Turbine Location



Viability of Large Scale Wind Farm Location



Discussion

Based on our model, the highlighted areas above showed the greatest potential for harvesting wind energy either on the industrial or private scale. Though there are areas that show higher wind velocity, other factors excluded them from being ideal locations such as proximity to power lines and roads, the protection of conservation lands, as well as land ownership. The difference between the interpretation of land ownership can be seen in the two primary maps above as they highlight different areas for possible use. Coastal areas, particularly near Eastport, are likely areas for personal wind turbine use primarily based off high wind velocities and private land ownership in the area. The state's western mountains show the greatest potential but are only likely to be developed in the Carrabassett region because of the absence of existing roads and power lines in the northern extent of the range as based on the 1993 data that was used to create the power line proximity data. This is consistent with what is understood to be current plans for the development of wind power in Maine.

Works Cited

- Maine Office of GIS. <http://apollo.gis.state.me.us/>. [Accessed April 15-May 3, 2007]
- American Wind Energy Association. <http://www.awea.org/>. [Accessed April 13-May 3, 2007]