Locating New Wind Farm in PA

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Introduction

When choosing a site for a new wind farm, there are many factors that must be considered. First is the actual wind potential that can be generated in the area. It may seem obvious, but a low point in a valley is not a very good place to build wind turbines. The best locations in terms of wind resource are typically high on mountains, in large open fields, or on the edge of bodies of water.

Another important factor to consider is the power demand in the area. It is much easier to approve a project where there is a high demand for the projects service. There is a much higher need for energy resources where the population is higher.

Methodology and Data

For this suitability analysis, I factored in three sets of data from PASDA:

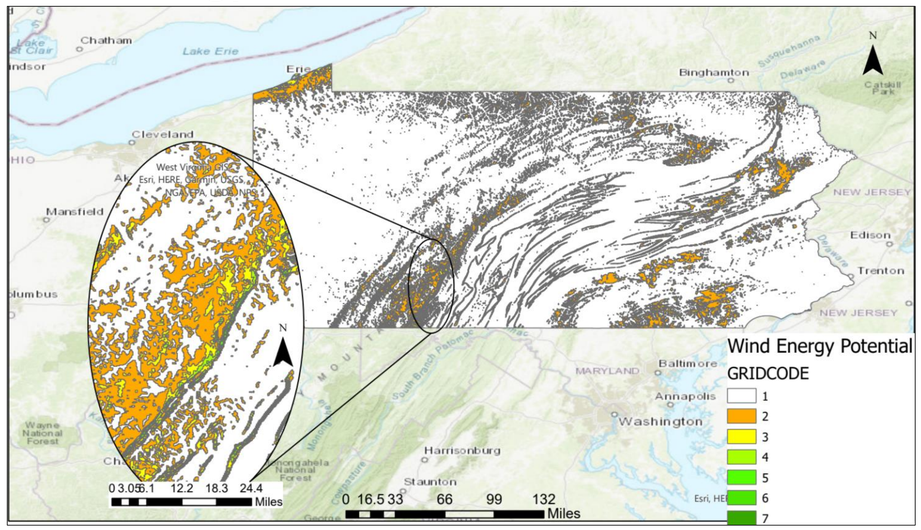
- The Wind Resource Potential Mid-Atlantic States
- EPA Renewable Energy Sites
- Major US Cities

The wind resource potential presented Raster Data that represented areas of varying degrees of wind energy production potential based on weather patterns. Each area is ranked 1-7. A 1 indicates verry poor potential, and 7 is the highest. Ranks 1-3 are identified as having poor potential and ranks 4-7 are considered high potential. For My analysis, I chose to use a rank of 4 as the lowest allowable rank for consideration. I used the select by attributes tool to create a new layer with only high potential areas. Then I used the model builder to identify high potential areas that are close enough to a major city to warrant the project, and not near a current wind farm.

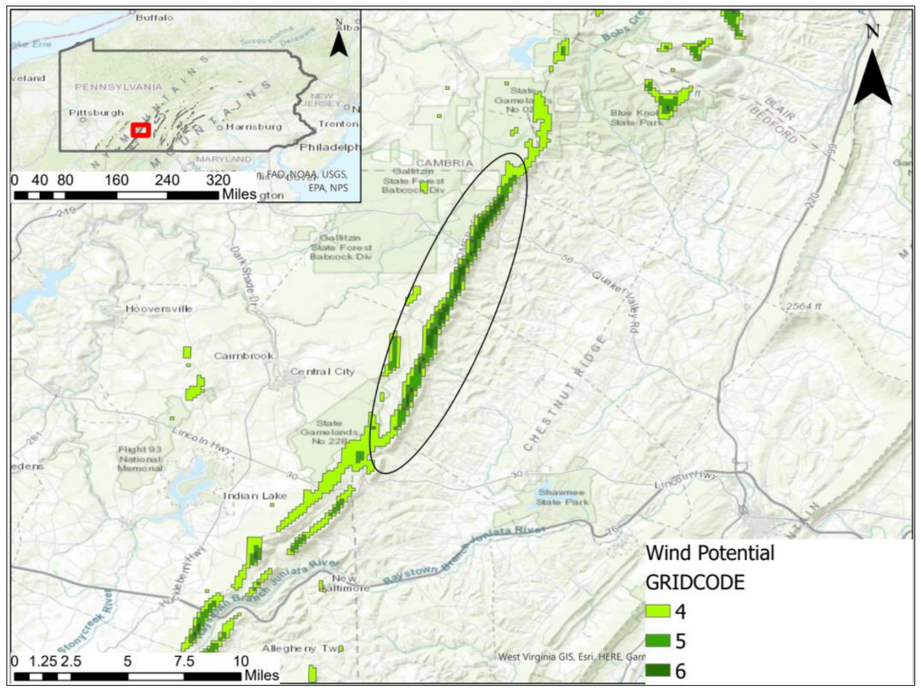
The parameters I chose for a suitable location are:

- Having good wind potential (Rank of 4 or more)
- Not within 50 miles of current wind farm
- Within 75 Miles of a Major City

Wind Energy Potential in Study Area (Figure 1)



Ideal Location For New Wind Farm (Figure 2)



Overview of Study Area

For the Study Area, I examined all of Pennsylvania. Pennsylvania is 46,055 square miles and has a population of 12.8 Million. The Appalachian Mountain range sweeps over most of Pennsylvania which results in low wind energy potential. Due to the disturbance from mountains, most of PA has very low wind energy potential. The Most promising area is in the southern central part of the state shown in figure 1.

Analysis

After conducting the suitability analysis outlined in the Methodology and Data section, I found one are that would be an ideal location for a new wind farm. There is a stretch of very high potential just east of central city shown in figure 2.

Conclusion

My initial takeaway from this analysis is that Pennsylvania is not an ideal state for producing wind energy. I have observed wind turbines atop mountain ranges before and assumed Pennsylvania's mountains would provide several good settings for Wind Farms. Unfortunately, this is not the case. With our depleting natural resources and climate crisis, it is vital that we as a society work to find more sustainable sources of power. For Pennsylvania, wind may not be the answer. Pennsylvania needs to explore other sources of renewable energy such as solar, hydro, or geothermal.

Work Cited:

ArcGIS Data Sources: https://www.pasda.psu.edu/

https://www.windpowerengineering.com/guidelines-selecting-sites/#:~:text=Although%20it%20may%20seem%20obvious,edge%20of%20bodies%20of%20water.