**SITE SUITABILITY ANALYSIS FOR SOLAR AND WIND ENERGY POWER PLANTS**

**WHY GREEN ENERGY?**
We currently rely heavily on non-renewable fossil fuels for our energy that will eventually dwindle. In contrast, renewable energy resources—such as wind and solar energy—are constantly replenished and will never run out. Green energy production is an increasingly important asset for any region as it is a source of clean, inexhaustible, secure energy.

In this project we are looking for potential renewable energy outputs for solar and wind energy throughout New England, New York, and New Jersey.

**SOLAR SITE SUITABILITY ANALYSIS**
All states within our target area contained many land pockets with high suitability for solar renewable energy. The most concentrated land pockets are along NY’s northern border with Canada, although places like ME, CT, and RI have land pockets more evenly distributed throughout the state. NY has the most range of suitable solar land pockets, which may be advantageous for variable cost structures to grow solar infrastructure. It is important to note that identified land pockets do not correlate well with populated, urban areas that would demand such energy use, necessitating the need for future solar sites to connect to existing and proposed transmission lines. The large pocket of federal land in northeast NY would be a unique challenge for proposed transmission line projects to navigate in order to reach the more populated urban centers such as Albany and New York City.

**SOLAR POTENTIAL**
To identify new solar sites, we want concentrated solar power greater than 3.85 kWh/m²/day. Those areas are identified in ME, NH, and NJ.

**DISTANCE TO CONCENTRATED SOLAR POWER**
We prioritized land pockets within 2 km of areas with high concentrated solar power. These land pockets are largely along the East Coast and on the border between NY and VT.

**SLOPE**
We prioritized land pockets with small slopes (<10%), which make it easier for renewable energy power plant construction. Besides the northern Appalachian Mountains, most of our target area meets this definition.

**WIND POTENTIAL**
To identify new wind farm sites, we want wind speeds greater than 6.5 m/s. Those areas are identified in NY, VT, and NH.

**WIND SITE SUITABILITY ANALYSIS**
While all states within our target area contain land pockets suitable for wind energy, NY is by far the most suited. NY has the most identified land pockets and also the densest concentrations of highly suitable land, particularly in upstate NY. Unexpectedly, there are not many land pockets along the coast, despite having high wind speeds all along from NJ to ME. Many more were west of the Appalachian Mountains, with some highly concentrated areas in western VT. In areas like western ME, there are high speeds but no transmission lines to service the area. Compared to solar energy, existing transmission line correlates well with land pockets, particularly traversing western NY.

**QUANTIFYING RENEWABLE ENERGY SITE POTENTIAL**
For our entire target area, 58.3% of land could be used for either solar and wind renewable energy, which amounts to 427,274 km². This area is slightly larger than the state of California, at 423,970 km². For solar energy, 4.8% is low suitability, 26.5% is moderate suitability, and 27% is high suitability. 27% of the land area amounts to 198,162.4 km², which is similar to the state of South Dakota. For wind energy, 2.7% is low suitability, 28% is moderate suitability, and 27.6% is high suitability. There is overlap in the land pockets we identified for solar and wind energy.

**DISTANCE TO TRANSMISSION LINES**
We prioritized land pockets within 2 km of existing transmission lines. Many of the lines conglomerate around cities such as Boston, MA; New York, NY; and Albany, NY.

**DISTANCE TO HIGH WIND SPEED**
We prioritized land pockets within 2 km of areas with high wind speed. These land pockets are among mountain ranges and coastal areas. NY, VT, NH, and ME all have these land pockets.

**THE PROCESS**
We used similar constraints for both the solar and wind site suitability. Federal land, park land, and wetlands are all off-limits to new construction for this project’s scope. Certain land covers were also off-limits: open water, developed land, forest, dwarf scrub, sedge/herbaceous, lichens, moss, and cultivated crops. Proximity to transmission lines was an attractant for both - we prioritized area within 8 km. We assumed that both solar and wind would prefer land with less than 10% slope, although in reality wind turbines are more tolerant of high sloping land. Our solar specific attractant was concentrated solar power (CSP) measured in kWh/m²/day, and our wind specific attractant was wind high wind speed measured in m/s.

Data Sources: NREL, USGS, Tufts M drive, Center for Land Use Interpretation, USGS, NWHC, NJ DEP, NPS, Project: Gould, US INR NU Equal Area

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