**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 output for solar and wind energy throughout New England, New York, and New Jersey.

We identified sites for potential power plants based on the technical potential of solar and wind energy. After taking into account land exclusions (wetlands, national and state parks, federal land and different landcover,) we used attracting factors to determine the most suitable locations for future renewable energy projects. The attracting factors include: slope of the terrain, distance to power lines, wind speed potential or solar potential.

**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 NJ 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/m^2/day. Those areas are identified in ME, NH and NJ.

**Wind Potential**

To identify new wind farm sites, we want wind speeds greater than 6.6 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 km^2. This area is slightly larger than the state of California, at 423,970 km^2. For solar energy, 4.8% is low suitability, 26.5% is moderate suitability, and 27% is high suitability. 27% of the land amounts to 118,156 km^2, 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.

**Site Suitability**


**Process**

- **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.

- **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.

- **Distance to Transmission Lines**
  - We prioritized land pockets within 2 km of existing transmission lines. Many of the lines concentrate around cities such as Boston, MA; New York, NY; and Albany, NY.