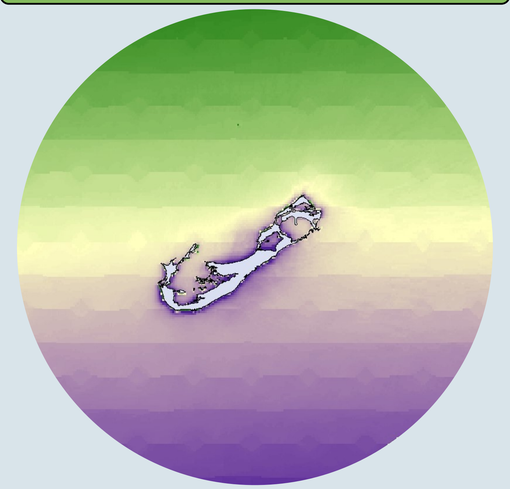
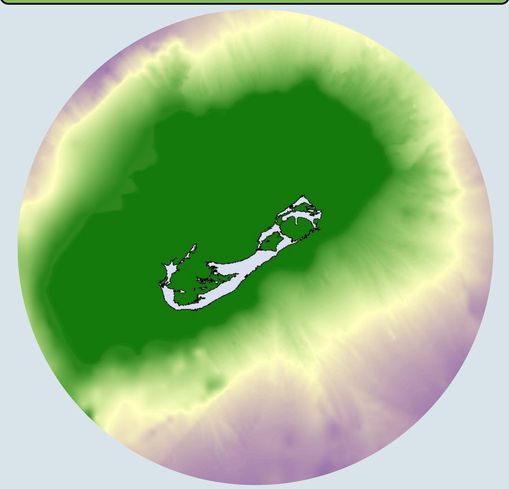
Offshore Wind Suitability in Bermuda

Achieving Energy Independence & Lower Electricity Prices

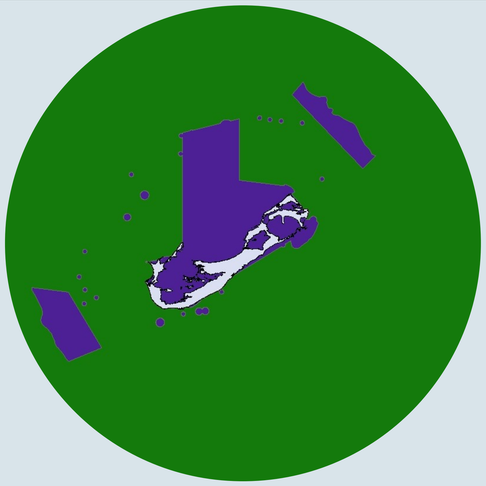
Wind Energy



Depth

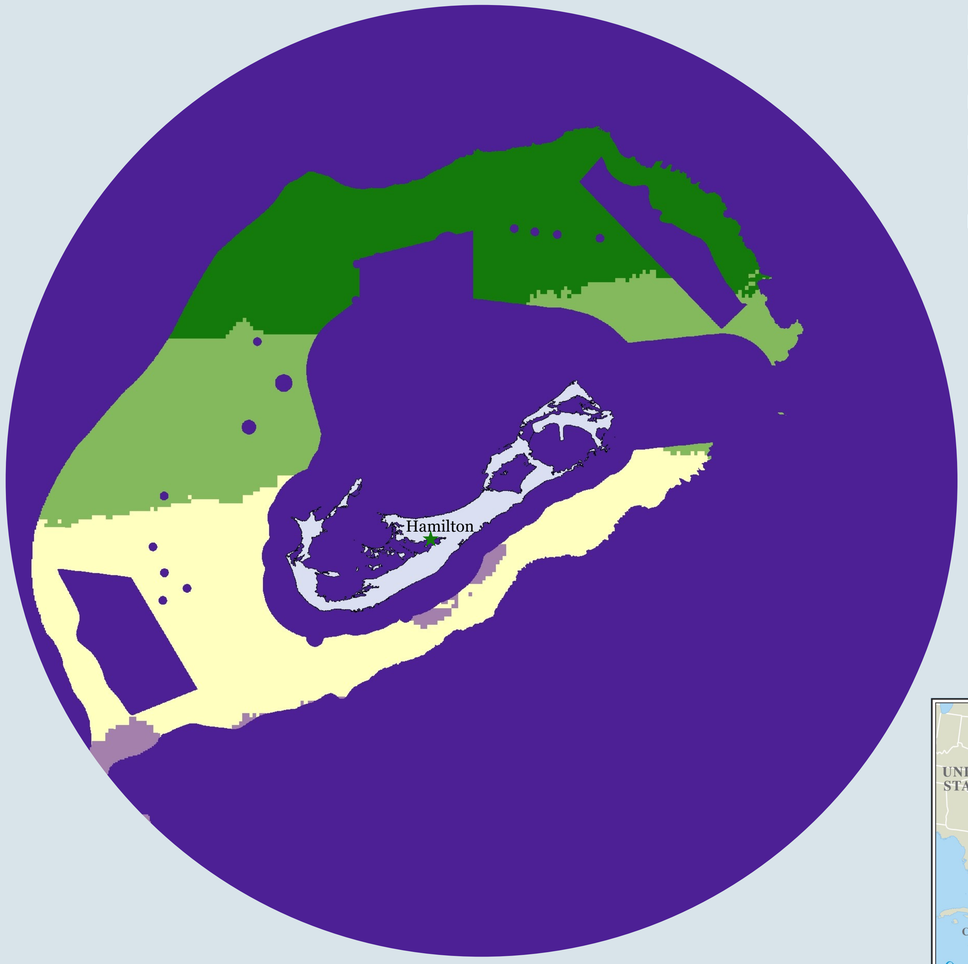


Protected Marine Areas



Shipping & Ferry & Coastal Buffer

Offshore Wind Suitability



- Most Suitable
- More Suitable
- Less Suitable
- Least Suitable
- Not Suitable
- Bermuda

N
W E
S

0 5 10 20 30 40 Kilometers

Background

Bermuda is a 26-mile-long island with 60,000 inhabitants located 600 miles off the coast of North Carolina. Bermuda is extremely energy dependent, importing more than 99% of its energy (heavy fuel oil and diesel). In addition to suffering from energy dependence, Bermuda also has high electricity costs.

One way for Bermuda to achieve energy independence and lower electricity costs is through renewable energy. Renewable technologies are ever improving and decreasing in cost. Multiple smaller islands, such as Tokelau, Ta‘ū, and El Hierro have already made the transition to 100% renewables, thus, becoming energy independent.

A recent 2018 survey by the Royal Gazette found that 68% of islanders prefer the Bermuda Better Energy Plan compared to the 13% who prefer the BELCO plan. The Bermuda Better Energy Plan calls for >20% of Bermuda’s energy to be generated by offshore wind by 2038.

Methodology

This poster analyzes the spatial viability of offshore wind for both traditional monopile and tripod technologies, as well as tension leg platforms. Considerations were given to the availability of wind energy, ocean depth, protected marine areas, and coastal buffers. Calculations were performed in ArcMap 10.6.1

The wind energy data came from Global Wind Atlas. The depth data was collected from NOAA and converted to a raster. The protected marine area layers were gathered from Bermuda Government data and unioned. The shipping, ferry, and coastal buffer data was derived from nautical charts and buffered. All data was, then, projected and reclassified from 0 to 4, when needed.

The final map uses a raster calculator to multiply the 4 input maps.

Conclusion

The findings of this map are consistent with previous research conducted by the Bren School at University of California, Santa Barbara and Etude. This spatial analysis finds that Bermuda has 208 km² of suitable area for offshore wind with > 410 W/m² of wind energy and 898 km² with >380W/m². With 100m turbines, spaced 1000m apart, Bermuda could become self-powered.

Future spatial research should expand upon this map to determine the viability of the Plantagenent Bank—located southwest of Bermuda—for offshore wind. Future research should also be completed to analyze the economics of offshore wind in Bermuda.

Adam Meyer | Tufts University | ENV 170: Environmental Data Analysis & Visualization | UEP 232: Introduction to GIS | Fall 2018 | Projection: Bermuda National Grid 2000

Special Thanks to Uku Uustalu and Bruce Johnson | Data Sources: Global Wind Atlas, NOAA, Government of Bermuda, Kevin Mayall | Photo Sources Carbon Brief, Moon