Wind Resource Temporal Variability Report

Diurnal and monthly variability of wind resources based on data from the NREL Wind Toolkit

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Contents


```
site_name_R <- params$site_name
site_lat_R <- params$site_lat
site_lon_R <- params$site_lon
start_date_R <- params$start_date
end_date_R <- params$end_date
paste0("In R land ", df_R$params.site_name[[1]], "is located at (", df_R$params.site_lat[[
```

```
[1] "In R land Mount Washingtonis located at (44.265121, -71.280396)"
```

```
site_name_py = df_py["params.site_name"][0]
site_lat_py = df_py["params.site_lat"][0]
site_lon_py = df_py["params.site_lon"][0]
start_date_py = df_py["params.start_date"][0]
end_date_py = df_py["params.end_date"][0]
print("In python land", df_py["params.site_name"][0], "is location at (", df_py["params.si
```

```
In python land Mount Washington is location at ( 44.265121 ,  -71.280396  )
```

xxx…frosting…re-calculate numbers with r to use in summary text. These chunks are include: false. Maybe pull the data with parameters in python, then save the pandas df to the data folder, then read in the df csv with tidyverse

Introduction

This report provides an overview of wind resources for xxx…location. This analysis is based on data from the NREL Wind Toolkit, in particular the dataset for wind speed at 100 meters.

xxx…add more text about the data

Site Map

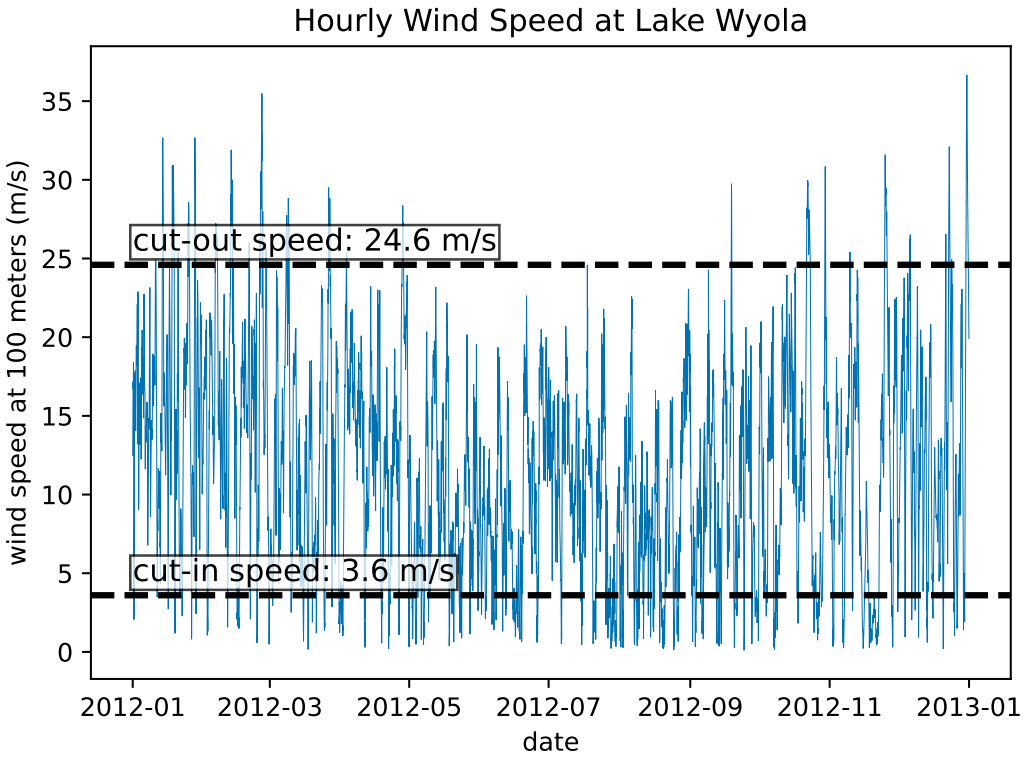
The map below shows the target location as well as the location of the nearest data point in the NREL Wind Toolkit.

```
<folium.map.Marker object at 0x7fcc81f39970>
```

```
<folium.map.Marker object at 0x7fcc81f39760>
```

```
<folium.folium.Map object at 0x7fcc81f0b6d0>
```

Analysis



index.html is for my 1 individual site and the report is / could be for expanding to other areas and times

read in the data with h5pyd and convert it to pandas, then save it as "data for report", then read in "data for report" with R...this will only work if parameters work with python

...or I could make a dataset with wind speeds to multiple sites

```
annual_average_windspeed = round(windspeed_100m_df["windspeed_100m"].mean(), 2)

if (annual_average_windspeed >= 5.8):
  above_below = "ABOVE"
else:
  above_below = "BELOW"

print("The annual average wind speed for xxx...location in 2012 was " + str(annual_average
```

```
The annual average wind speed for xxx...location in 2012 was 11.69 m/s.
```

```
print("This is", above_below, "the value recommended by the U.S. Energy Information Admini
```

```
This is ABOVE the value recommended by the U.S. Energy Information Administration.
```

The annual average wind speed for Mount Washington is 11.69. This is ABOVE the value of 5.8 m/s (13 mph) recommended by the U.S. Energy Information Administration.

```
In 2012, wind speed was below the cut-in speed of 3.6 m/s for 1,148 hours.
```

```
Therefore, wind turbines could not operate 13.07 percent of the time due to lack of wind.
```

```
In 2012, wind speed exceeded the out-out speed of 24.6 m/s for 346 hours.
```

```
Therefore, wind turbines could operate 3.94 percent of the time due to strong wind.
```

```
In 2012, wind speeds at this location would be within the acceptable operating range of
```

```
3.6 m/s to 24.6 m/s for 7,290 hours. Turbines could operate 82.99000000000001 percent of the
```

- if the annual average wind speed is at least 13 mph (5.8 m/s) *side margin 1
- how often the wind is below the cut-in speed - 8 mph (3.6 m/s) *margin 2 (% of time)
- how often the wind exceed the cut-out speed - 55 mph (24.6 m/s) *margin 2
- does the diurnal pattern match daily electricity demands
- does the monthly pattern match seasonal electricity demands

Limitations

Citations

footnote1: The U.S. Energy Information Administration recommends an annual average wind speed of at least 9 mph (4 m/s) for small wind turbines and 13 mph (5.8 m/s) for utility-scale turbines. https://www.eia.gov/energyexplained/wind/where-wind-power-is-harnessed.php#:~:text=Good%20places%20for%20wind%20turbines,)%20for%20utility%2Dscale%20turbines.

footnote2: https://www.energy.gov/eere/articles/how-do-wind-turbines-survive-severe-storms